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TRANSPORTATION

No. 12

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MOTOR VEHICLE

NEED FOR ROAD CONSTRUCTION, REPAIR DISCUSSED

Moscow EKONOMICHESKAYA GAZETA in Russian No 18, Apr 80 p 2

[Article: "In the CPSU Central Committee and the USSR Council of Ministers"]

[Text] The CPSU Central Committee and the USSR Council of Ministers have adopted a decree "On Measures To Improve the Construction, Repair and Maintenance of the Country's Roads."

The decree notes that in recent years in the country a considerable amount of work toward the development of a road network and the strengthening of the industrial base of road construction and maintenance has been accomplished. The construction and refurbishing of a number of important major highways has been completed during the current five-year plan.

Nonetheless, the construction of motor roads lags behind the needs of the economy.

The network of good modern-type roads with improved surfaces, especially in the RSFSR, is insufficiently developed, and the condition of the roads does not meet the increased traffic density and load capacity of motor transport. There are serious shortcomings in the repair and maintenance of roads.

The road-construction machinery manufactured by the Ministry for Construction, Road and Municipal Machine-Building and the Ministry for Heavy and Transport Machine-Building does not satisfy the needs of road construction and maintenance neither in terms of assortment nor individual machine capacity.

Some local party and Soviet organs pay little attention to the development of road-construction and maintenance and the improvement of labor conditions and services to road workers, use less than fully the available potential for expansion of local road construction and render insufficient assistance to the primary party organizations and economic managers of enterprises in this branch in their efforts to improve work with personnel and incorporate progressive experience.

Bearing in mind that roads are acquiring an ever greater economic and social significance and proceeding on the basis of the requirements of the November (1979) CPSU Central Committee Plenum pertaining to the improvement of the transport system, the CPSU Central Committee and the USSR Council of Ministers recognized as necessary the essential accomplishment by 1990 of:

- the development of a major highway system with improved surfaces to insure reliable road communication among the country's major economic regions and cities and towns;

- the construction of roads connecting rayon centers, kolkhoz and sovkhoz farm centers, first and foremost in the Nonchernozem Zone of the RSFSR.

A target of 80,000 km of new road construction including 11,500 km of national and republic roads has been established for the years 1981-1985. The construction and refurbishment of a number of important major highways is planned for 1981-1990.

The decree stipulates the standardization of the planning and financing of the funds allocated for the development of road construction and maintenance.

The allocation to the union republics' councils of ministers of the necessary materials, machines and mechanisms to carry out road construction, refurbishment and maintenance in 1981-1985 is planned.

The CPSU Central Committee and the USSR Council of Ministers have assigned:

- the Ministry of Transport Construction to clarify in cooperation with the union republics' councils of ministers and the interested all-union ministries and departments and to approve with the cooperation of the USSR Gosplan a comprehensive road construction program for the RSFSR;

- the USSR Ministry of the Construction Materials Industry to develop and approve in 1980 with the participation of the all-union ministries and departments and the union republics' councils of ministers measures designed to increase the production of high-strength crushed rock in order to completely satisfy the needs of road construction and repair in the 11th Five-Year Plan, taking into account the products manufactured by the road construction organizations;

- the Ministry of Construction, Road and Municipal Machine-Building and RSFSR Ministry of Roads to develop with the participation of interested all-union ministries and departments and the union republics' councils of ministers and to submit to the USSR Gosplan and USSR Gosstroy in 1980 proposals for the development of production capacity for high-efficiency systems of road-construction machines, mechanisms and equipment having

increased individual capacity for the comprehensive mechanization of production processes associated with road construction and maintenance and for a reduction in the manual labor needed in road work;

--the USSR Gosplan starting with 1981 to provide for the allocation to the RSFSR Ministry of Roads the necessary number of dump-cars intended to transport non-ore materials in order to insure road construction in the RSFSR and also such construction performed by this ministry;

--the Ministry of the Chemical Industry, the USSR Gosnab, the USSR Ministry for Internal Affairs and the RSFSR Ministry of Roads to develop in 1980 and implement in 1981-1985 measures designed to increase the production and supply to the union republics' road-construction organizations the necessary materials for marking roads and providing services on them, reflecting tape for road signs and materials for work clothes;

--the USSR Ministry of Communications and the Ministry for the Communications Gear Industry to develop in 1980 and implement in 1981-1985 jointly with the RSFSR Council of Ministers, the Ukrainian SSR Council of Ministers, the Belorussian SSR Council of Ministers and the Moldavian SSR Council of Ministers measures designed to establish telephonic communications on the following roads: Moscow--Minsk--Brest, Moscow--Kiyev--Kishinev--Leusheny, Moscow--Khar'kov--Simferopol', Moscow--Leningrad--Vyborg--Torfyanovka and Kiyev--L'vov--Chop;

--the Ministry of Instrument Construction for Automation and Management Systems, the USSR Ministry for Internal Affairs and the RSFSR Ministry of Roads to develop in 1980 jointly with the union republics' councils of ministers measures designed to increase in 1981-1985 the production of instruments and equipment for mobile automotive laboratories in order to assess the quality of road-construction work and road conditions and to determine traffic patterns;

--the Ministry of Transport Construction to develop with the participation of the union republics' councils of ministers and to submit for approval in 1981 to the USSR Gosstroy and the USSR State Committee for Science and Technology a comprehensive program of scientific studies in the field of road construction through 1990, having provided in it for the development of progressive technologies associated with road construction, the utilization of effective and nontraditional materials in this field and the recycling of industrial wastes and by-products;

--the union republics' councils of ministers to develop and implement in 1981-1985 measures designed to increase road performance characteristics, observance of road usage standards between periods of repair work and also to develop along the roads a network of auto service enterprises, stipulating the allocation for these purposes of the necessary financial and material resources;

--the USSR Gosstroy and the USSR State Committee for Forestry to develop and approve in 1981 jointly with the USSR Ministry of Agriculture and the union republics' councils of ministers recommendations for the expansion in 1981-1985 along all-union and republic roads of protective forested strips for the purpose of reducing the energy and labor costs associated with wintertime maintenance of these roads;

--the USSR Ministry of the Petroleum-Refining and Petrochemical Industry, the Ministry for Heavy and Transport Machine-Building and the Ministry of Transportation to develop in 1980 proposals designed to increase in 1981-1985 the production of improved road-quality petroleum bitumen, distribute and transport it efficiently, and the USSR Gosnab and the USSR Gosplan to take these proposals into consideration in the development of draft plans;

--the union republics' councils of ministers to develop in 1980 measures designed to reduce labor turnover and improve the daily service to workers engaged in road construction, repair and maintenance and to submit these measures to the USSR State Committee for Labor and Social Problems, the USSR Ministry of Finances and the All-Union Central Committee for Trade Unions;

--the USSR Ministry of Finances to develop and approve in 1982 with the participation of the union republics' councils of ministers standard financial expenses associated with the repair and maintenance of general-purpose roads.

The CPSU Central Committee and the USSR Council of Ministers have obligated the central committees of the union republic communist parties, the kray and oblast party committees, the councils of ministers of the union and autonomous republics, the executive committees of the kray and oblast soviets of the people's deputies as one of the most important tasks to consider the implementation of the comprehensive measures for mobilizing the internal reserves needed to accelerate road construction through concentration of available material and financial resources and to improve production technology and organization. To draw attention to improving road construction quality and the organization of road repair and maintenance, developing the industrial base of road-construction organizations and strengthening them with qualified workers and specialists. To strive for the across-the-board incorporation of modern production methods of labor organization and the dissemination in the road-construction industry of the principle of work-team contracts and other progressive forms of labor organization.

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CSO: 1829

RAILROAD

NEED TO MODERNIZE VOROSHILOVGRAD LOCOMOTIVE PLANT NOTED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 3 Apr 80 p 2

[Article by G. Dorofeyev, staff correspondent, Voroshilovgrad: "Simmering on Paper—the Enterprise and the Ministry"]

[Text] The Voroshilovgrad locomotive-building production association is our country's largest enterprise for the development and manufacture of locomotives. It has a rich history and rich traditions. They have been manufacturing locomotives here for more than 50 years and in 1956 the Voroshilovgrad workers began producing diesel locomotives. It should be noted that this change was accomplished without remodeling the basic and auxiliary shops.

But life has not been at a standstill. It looks as if this has been forgotten both at the plant and at the Mintyazhmash [Ministry of Heavy Machine-Building]. The demand for locomotives has grown from year to year but the production base is unchanged. True, they began a long time ago to talk about the need to develop the Voroshilovgrad diesel locomotive production plant. Back in the 1960's an order from Mintyazhmash approved a planning assignment for remodeling of the enterprise. This document called for the construction and putting into operation of 61,300 square meters of production areas. It was planned, in particular, to erect a billet and pressing building, a stamping and tool shop, and other installations. This work was supposed to be completed in 1973. But it has not been fulfilled even to this day.

"Under our conditions," they say at the plant, "it is difficult to provide for fulfillment of the prescribed plans."

All this is quite true. But who, we may ask, created these conditions?

The delay in remodeling in the shops has resulted in difficult conditions for the work. Thus, for example, in Shop No. 2, where they manufacture control panels for all the types of diesel locomotives, safety devices and other equipment, there is a low level of mechanization and there is no

place to store the finished output; it is left right in the assembly sectors. In the winter the shop is cold and in the summer it is hot.

Also working under difficult conditions is the collective of the shop for the manufacture of locomotive bodies. The quarters there are very tight, the work very cramped, and the organization of production poor. Welding, priming and painting of products--all these operations are carried out in one space. One operation is not coordinated with another and people interfere with one another, which undoubtedly impairs quality and reduces productivity.

Yu. N. Il'in, chief of the All-Union Locomotive and Track Machine-Building Association Soyuzteplovozput'mash is well acquainted with the problems of the Voroshilovgrad locomotive-building workers. And as far as the solution of these problems is concerned, he has nothing in particular to brag about.

Let us look at one such problem. In the industrial association it is a known fact that the locomotive builders have suffered at the hands of the supplier--the Kharkov Elektrot'yazhmash [Heavy Electrical Machinery Plant], which, since the beginning of the five-year plan, has been short hundreds of traction motors in its deliveries. This alone accounts for the fact that in amounts received the country's railroad transport has been shorted more than 300 sections of trunk line diesel locomotives with an aggregate capacity of nearly a million horsepower. The Voroshilovgrad machine-building workers have virtually no carry-over technological stockpiles, a situation which leads to great losses of working time and disrupts the rhythmic operation of the enterprise. They talk about this in the association and they write numerous letters but there has not been one iota of change for the better.

The technology of correspondence on this subject has been worked out in strict fashion and is impeccable. Some make an "inquiry" and others furnish the "reply." Schedules are drawn up and telegrams composed. In general, this creates the impression that the work is simmering. But this paper simmering is having no effect on the task at hand.

At the end of each year, for example, the Ministry of Electrical Engineering Industry [Minelektrotekhprom] sends out a paper guaranteeing that it will supply the necessary component items to the locomotive builders. Here is a typical document of this kind. "Minelektrotekhprom," writes Deputy Minister G. Voronovskiy in his letter No 32-11265 of 25 November 1979, "has reviewed the 1980 Mintyazhmash requirements for locomotive electric equipment to be delivered by the Kharkov Elektrot'yazhmash plant and hereby advises that the plant's production capacities will enable it to manufacture and deliver in 1980 to the locomotive-building plants of Mintyazhmash electrical equipment for 1,522 sections of trunk line locomotives. The delivery of this equipment will be in the quantities and within the time limits stipulated in the contracts concluded."

On the basis of this document, a contract is of course concluded and a schedule drawn up for the deliveries. This schedule for the first quarter, for example, was coordinated with and approved by Deputy Minister of Heavy and Transport Machine Building R. Artyunov and Deputy Minister of Electrical Engineering Industry N. Galev. But in January the time limits for deliveries had already been disrupted.

The disruption of the schedule for deliveries virtually paralyzed the work of the assemblers. They initially assemble the locomotive without the electric motor, paint it, and put it off to the side. As soon as the equipment arrives, they return the locomotives to the assembly area. This creates a counterflow in the technological chain. In this time they are performing dozens of additional operations which require large labor and material input.

The internal and external unresolved problems have placed the association in a difficult situation. Since the beginning of the 10th Five Year Plan the association collective has time and again failed to fulfill the established plan and has been short approximately 500 planned locomotives in its supply to the country. And at the same time, if we believe the report data, everything looks more or less satisfactory. For example, last year the assignment was 100.8 percent fulfilled. But it turns out that this fulfillment was a consequence of a correction in the plan.

Now they are again bringing up the subject of technical retooling of the enterprise. A new decree has been adopted for development of the plant. More than 200 million rubles have been allocated for its remodeling. But putting these funds into operation requires a high-powered construction base. Still acting as the contractor here is the Voroshilovgrad industrial construction trust Voroshilovgradpromstroy, which has been building a billet shop for nearly five years now. The work volumes fulfilled by this organization for construction of the shop do not exceed 6-7 million rubles a year. In other words, it may turn out that the new decree for the development of the plant will be unfulfilled, as were those which were adopted previously.

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CSO: 1829

OCEAN AND RIVER

RIVER FLEET PROBLEMS IN WESTERN SIBERIA'S OIL AND GAS REGIONS

Moscow VODNIY TRANSPORT in Russian 17 Apr 80 p 1

[Article by V. Avvakumov, Deputy Chief of the Irtush Steamship Company, and G. Vstavskiy, correspondent: "Northern Wharves"]

[Text] As we have already informed our readers, the CPSU Central Committee held a conference on the problems of strengthening capital construction in the region of the Western Siberian Oil and Gas Complex.

V.I. Dolgikh, a CPSU Central Committee Secretary, delivered the report to this conference.

Taking part in the discussion of the report were the directors of the Tyumen' and Tomsk CPSU Obkoms (Oblast Committees), ministers and workers of the USSR Gosplan, and L.V. Bagrov, RSFSR Minister of the River Fleet.

Today we are publishing an article which raises a number of problems connected with transportation guarantees for the most important construction sites in the oil and gas regions of Western Siberia, as well as the development and strengthening of the river fleet's material base in the eastern part of the country.

During the last few years in the boundless spaces of Western Siberia, primarily in Tyumenskaya Oblast, a very large national economic complex was created, the country's principal oil and gas base. There has been a substantial contribution by the river-transport workers to these projects because the chief route to the oil and gas regions still remains the numerous rivers of the Ob'-Irtysk Basin. During the last four shipping seasons alone, the river workers of the Irtysk Steamship Company have supplied the oil workers, geologists, gas workers and builders of the Tyumenskaya Oblast with about 30 million tons of various types of freight. Under complicated navigational conditions the boatmen of the Irtysk and Ob' have solved and are solving the responsible tasks which the Motherland has assigned to them, and every year they have increased their hauling pace.

However, this growth rate is still lagging behind the requirements of the warehousing patronage of the Tyumen' region. There are many reasons for this. The northern wharves have become a large brake on the operation of the Siberian fleet, and this is not surprising. Just look at how the rivermen are operating in Urengoy, Nadym, Salekhard, Sergino, and Nizhnevartovsk! Almost all the cargoes is unloaded onto temporary wharves at best, and more often it is simply put onto the river banks. Today in the North and in the middle part of the Ob'-Irtysk Basin as well there is an acute shortage of wharf equipment, warehouse space, and crane equipment. This is why the intensity of cargo operations in the northern wharves is almost twice as low as it is in the middle section of the Irtysk Steamship Company.

In order to increase the flow of cargo to the oil and gas regions of Tyumenskaya Oblast and to sharply raise the effectiveness of the fleet's operation, a decision was adopted in 1977 concerning the construction of general-use, mechanized wharves in Nizhnevartovsk, Nadym, Urengoy, Sergino, and Nabytnangi. The total extent of the wharves under construction amounts to almost 3,000 meters.

The construction of the new wharves began on practically bare ground, in regions which are uninhabited and difficult of access. Hence, the rivermen and builders have had to solve extremely complex problems. And, in the first place, it was necessary to establish a new construction base, to organize new sections, detachments, and trusts. For these purposes the "Zapsibgidrostroy" Construction and Installation Trust of the USSR Ministry of Transport Construction was created in Surgut, management boards for the ports under construction were organized in Urengoy, Nadym, and Sergino, while in Salekhard capital-construction divisions were set up. At the same time the capital-construction division was also strengthened in the management board of the Irtysk Steamship Company.

Since the beginning of construction of the northern ports, quite a large amount of work has been carried out. Within compressed time periods groups at the "Giprorekhtrans" and "Sibgiprorekhtrans" Institutes prepared plans and estimates. The builders completed a large volume of operations with respect to getting the land and water areas of ports in shape as well as creating residential settlements, and they proceeded to install mooring embankments.... In this past year of 1979 alone capital investments of approximately 17 million rubles were absorbed. Nevertheless, the pace of construction of the northern wharves has remained low.

One of the principal reasons hindering the ports from being built more rapidly is the insufficient capacity of the construction organizations. The USSR Ministry of Transport Construction should be concerned with strengthening its own subdivisions in this area. And it is especially necessary to render aid to the "Zapsibgidrostroy." The trust has a weak production base, this group is experiencing serious personnel difficulties, and at many construction projects people are not guaranteed the necessary housing and domestic conditions. Hence there is a large turnover among personnel.

Therefore, without necessary and timely aid on the part of the Ministry of Transport Construction it will be difficult for the builders to carry out an intensified program with regard to contracting northern ports.

Particular attention must be paid to constructing the wharves to the Urengoy port. Building a port on the Pura is the concern of a section of the Nadym Shipping Construction Detachment, but its efforts are clearly insufficient. It is obviously high time for the Ministry of Transport Construction to create here an independent construction organization, a production base, and a residential settlement.

Last year considerable foot-dragging was permitted with regard to building wharves in Nishnevartovsk. And what was it that hindered the builders in carrying out their assigned task? In the first phase they experienced a severe shortage of materials; then there ensued a high flood on the Ob'. But the main thing in the actions of the subcontractor was a great lack of organization and poor analysis. In particular, matters were greatly interfered with by a frequent change of supervisors of the construction organizations, as well as foremen and construction superintendents. A great deal of time and effort had to be expended on compelling the Ministry of Industrial Construction to free up the construction sites of freight. By the way, even today part of the area of the future port is clogged up with freight belonging to this ministry.

We must be objective: the fault for the slow progress of the work at certain construction projects also lies with the client. Thus, the rivermen held back on deliveries of mineral construction materials, and a considerable bottleneck occurred in the solution of organizational problems. But it must be admitted that the controls on the part of the steamship company's directors as well as of the basin's public organizations for these important construction projects were not up to par.

A major shortcoming of all the ports under construction is the fact that in the plans for these construction projects such facilities as housing and children's institutions do not loom importantly. And already today at these construction projects a serious disproportion has been noted with regard to carrying out the social and domestic program. Because the ports are being built, and then they will be utilized by people; for the latter we must create the necessary conditions for living. Today it is clear to everyone that the economic and social problems must be solved in a close, mutual inter-relationship. On several occasions the Steamship Company has posed these questions in the appropriate main administrations of the Ministry of the River Fleet. However, up to now such a disproportion still exists, and the problem has found no positive solution.

There is yet another, very timely problem. With the introduction into operation of new wharves there will be a several-fold increase in the flow of freight to the northern trans-shipment points--to Labytnangi and Sergino.

But even though wharves are being built, no progress is being made on the modernization of railroad terminals. In Labytnangi, for example, railroad cars are being shipped to the existing wharves, though the railroad branch has not yet been put into operation. The USSR Ministry of Railways is not enlarging the existing station at Labytnangi. And without this the northern port will not be able to increase its throughput capacity or set up a smooth operation of the wharves. While it is not too late, we must do everything so that from the first days of the new wharves' operation both the water and the railroad transportation modes are functioning precisely.

During the culminating year of the 10th Five-Year Plan we are confronted with very responsible tasks with regard to the further construction of the northern ports. In this period it will be necessary to absorb more than 20 million rubles and to put 100 meters of wharves into operation in Labytnangi.

But in order to put the projects now underway into operation, we must speed up the delivery of materials and equipment, not reduce the pace of construction, and establish rigid controls over the schedule of progress on all operations. All this will allow the wharves to be put into operation more rapidly and will speed up the development of oil and gas deposits. And, therefore the country will receive more Siberian fuel.

2384

CSO: 1829

OCEAN AND RIVER

IRTYSH RIVER OPENED TO INLAND TRANSPORT

Moscow VODNIY TRANSPORT in Russian 17 Apr 80 p 1

[Article by V. Grigor'ev: "Ships Are Being Loaded"]

[Text]

The river men of the Irtysh Steamship Company--initiators of a republic-wide competition--have begun to carry out an intensified program of shipping. The first pennant was raised by the crew of the icebreaker "Ob". This ship proceeded to open up the river in the Omak roadstead. Then the icebreaker will adopt a course for Tobol'sk, to which within a few days another icebreaker of the Irtysh Steamship Company--the "Captain Flakhin"--must break its way. It began to run its icebreaking course from the North, from Khanty-Mansiysk. The man-made opening up of the basin's rivers will allow the Siberian inland water workers to commence shipping from five to ten days earlier than usual. This is one of the principal reserves for the successful fulfillment of the state plan and the increased obligations taken on for the last year of this five-year plan.

During the current shipping season the tasks which confront the river men of the Irtysh are very responsible ones. As compared with last year, the volume of hauls has increased by 12.5 percent. Just to the oil and gas regions of Tyumenskaya Oblast alone they must deliver 8.3 million tons of various types of cargoes--870,000 tons more than were shipped there in 1979.

How to more successfully carry out what has been planned was recently the subject of a detailed conversation at a meeting of the Party economic active membership of the steamship company. Its participants discussed and outlined a complex of measures for improving the utilization of the fleet. The plan of organizational and technical measures has provided for a reduction in the idle times of ships while they are being processed, especially at clients' wharves, an increase in the return-trip loading of the fleet, and a reduction in the idle times caused by ships stopping in the Far North. During the 1980 shipping season on the Irtysh there will be an increase in the number of large-cargo barge trains as well as that of vessels operating in accordance with the group method. In the basin's ports there will be a further development of the initiative of the Leninograd transport workers.

A well-organized socialist competition will become an important condition for the successful completion of the shipping plan and the obligations. In the basin ten progressive groups have acted as the initiators of a pre-schedule completion of the one-year and five-year plans. The crews of four complex lines have decided to operate in accordance with a unified group plan and to release five vessels to other sections. Among the initiators are the crews of the following ships: "Chakly-11," "Morakoy-5," OT-2018, Th-679, OTA-994, "Klik," and others.

Now on the Irtysh the putting of ships and port machinery into operation is proceeding full swing. Ships are being loaded for the first runs of the season.

2384

CSO: 1829

OCEAN AND RIVER

VOSTOCHNYY PORT OPERATIONS AND FACILITIES DESCRIBED

Moscow EKONOMICHESKAYA GAZETA in Russian No 11, Mar 80 p 1

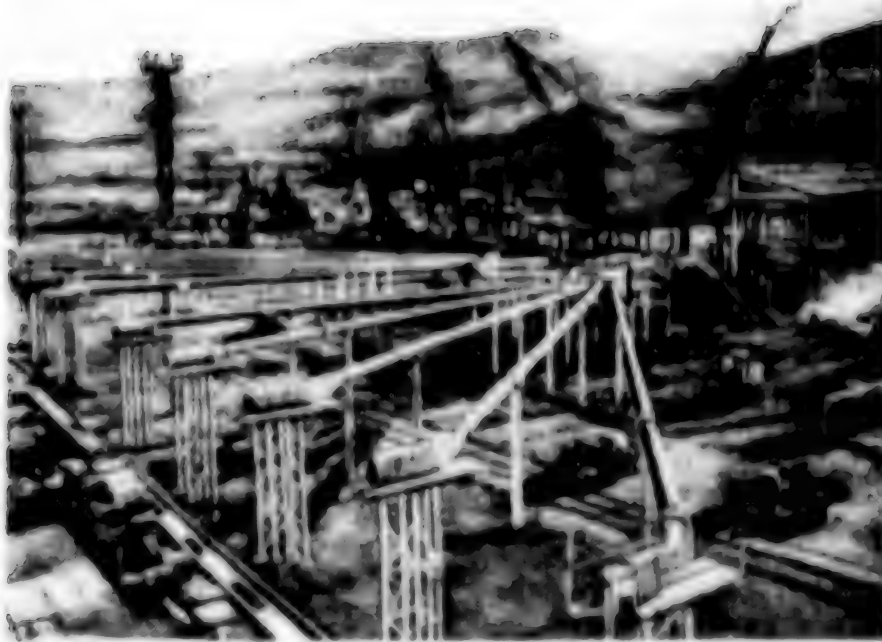
[Article under the heading: New Construction of the Five-Year Plan.]

[Text] In the 10th Five-Year Plan, on the shore of the Pacific Ocean, thirty kilometers from the city of Nakhodka, the first stage of construction of Vostochnyy Port - the largest maritime commercial port - was completed. In congratulating the participants in the construction and the port operators on this occasion, Comrade L. I. Brezhnev noted that completing construction of the new port will improve transport communications significantly in the north-east regions and will create favorable conditions for further development of the foreign economic relationships of the country.

In its capacity, and in its degree of technical equipment, Vostochnyy Port will significantly surpass all existing ports in the Soviet Union. Four specialized complexes make up the first phase. One of them, for processing timber, has a throughput capacity of 400,000 tons per year. Another is an automated complex for processing 800,000 tons of technical-grade wood chips. The third is for the transshipment of 700,000 large-capacity containers. The largest complex is for the transshipment of 6,000,000 tons of coal per year.

The port operators' equipment includes a variety of the latest technology which substantially reduces labor in loading and unloading operations. Dock mechanics control complex electronic equipment and monitor the operation of the huge technological complexes, ensuring the operation of mechanisms hundreds of meters away from their place of work.

A future new city of seamen in the Far East is growing up with the port. At present it consists of two workers' settlements called Beryegovoy and Pervostroiteli, where well-built houses having a total area of more than 80,000 square meters have been erected. A school, playgrounds, a club, stores, and other normal, social and cultural facilities have been built. The settlement of Beryegovoy has good transportation connections with Vostochnyy Port and the city of Nakhodka.



The Wood Chip Processing Complex

The personnel of the young port are successfully mastering the complicated processing equipment. In the past year, the designed capacity of the complexes for timber and containers was exceeded. At the wood chip and coal complexes, the entire volume of technical-grade wood chips and coal presented for transshipment was processed.

The successful operation of Vostochnyy Port is the result of the outstanding work of all its personnel. In preparing an appropriate celebration for the 110th anniversary of the birth of V. I. Lenin, a competition has been developed at the port for the fulfillment of the plan for 1980 ahead of schedule, and for the quickest possible development of the designed capacity of the port as a whole.

The port of Vostochnyy continues to be built. In the top photograph [not reproduced] from left to right, are the first-rate construction workers: V. G. Belinets, P. D. Toropov, M. S. Petrovich and A. N. Kleshchev.

9136
CSO: 1829



The Transportation of Cargoes by Ships
of the Ministry of the Maritime Fleet
(millions of metric tons)

<u>1965</u>	<u>1970</u>	<u>1975</u>	<u>1980(Plan)</u>
119.3	161.9	200.0	231.4



The Coal Processing Complex

OCEAN AND RIVER

POTENTIAL USE OF MODULAR CUBES ON CARGO SHIPS STUDIED

Moscow TEKHNIIKA MOLODEZHI in Russian No 3, 1980 pp 44-45

[Article by Zoya Tishchenko, Engineer, City of Sevastopol': "A Tanker Made of Blocks"]

[Text] In 1976 some alarming news spread around the world -- on the western coast of France a supertanker, the "Olympic Bravery," had broken up against the rocks. Fortunately, this catastrophe did not turn into a national calamity -- the ill-fated ship was empty and only a small amount of lubricant poured into the ocean from its broken fuel tanks. But then two years later, in the same area, another supertanker, the "Amoco Cadiz," broke up, this time with a full cargo, and 2,000 square kilometers of the ocean was covered with a black oil film, which caused enormous damage to the French economy.

However, the "Amoco Cadiz" catastrophe was only another link in a very long chain of extremely dangerous tanker accidents. There is no exaggeration here, for experts have calculated that the simultaneous destruction of a dozen supertankers each with a capacity of more than 200,000 tons could turn into a global calamity. The point is that petroleum which has poured out onto the surface of the ocean sharply reduces the natural evaporation of water, disturbing the heat exchange between the water and the atmosphere, which could have a negative influence on the planet's climate.

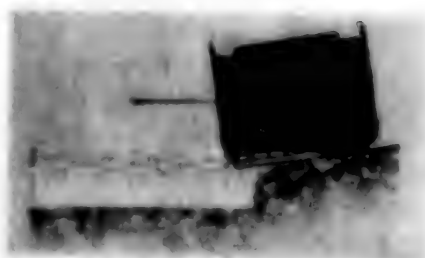
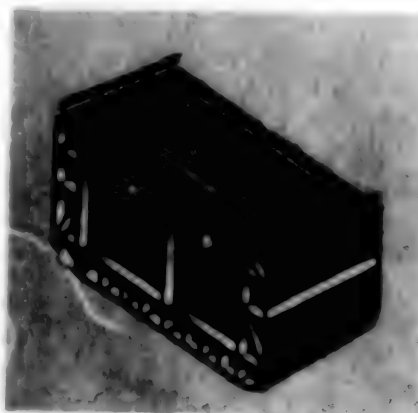
What is the way out? Will it really be necessary to suddenly stop the operation of all tankers, and lay them up until a better day? No, this is impossible, since tankers deliver 60 percent of the petroleum from the fields to consumers -- much more than land transport and overland pipe lines taken together. In addition, the transportation of petroleum and petroleum products on large ships is several times cheaper than on tankers of ordinary size (with a capacity of 50,000 tons). This, incidentally, explains the genuine epidemic of gigantism which in recent decades has taken possession of the shipbuilding enterprises of Japan, Spain, the FRG, Norway, and other capitalist countries -- in our day a tanker with a capacity of 100,000 tons is no longer regarded as a mastodon.

However, the increase in tonnage has engendered a problem in the construction of super-large ships at plants which do not have spacious building slips and powerful launching equipment. It was solved first by the Japanese who became convinced that this could be done in dry docks which are filled with water after the work on a giant ship is approaching its end. This is a seemingly good solution, except that only a small number of docks as of now are designed above all for repairs. If such a structure is engaged in building a ship, then a ship whose time has come "to be treated" either has to wait, which is extremely unprofitable for its owner, or else go to sea in a defective condition.

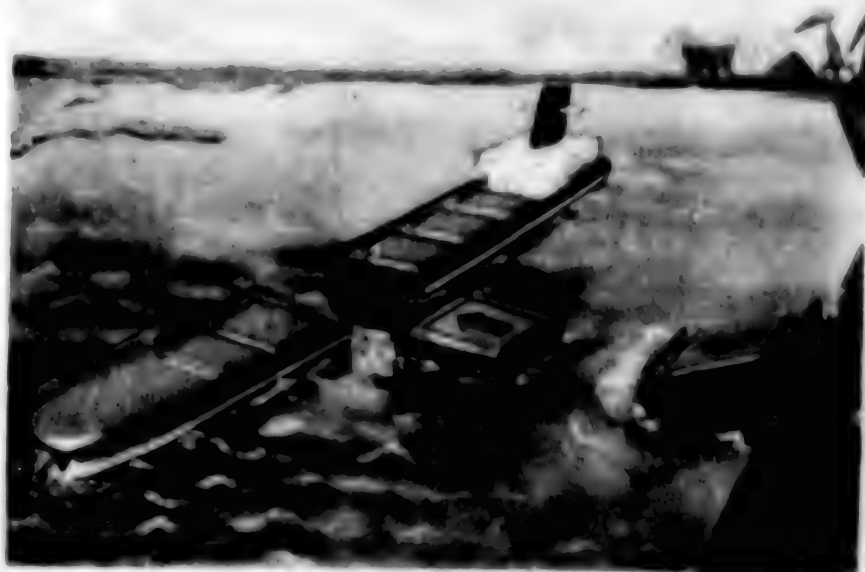
There are certain difficulties connected with the construction of super-ships in our country also. True, the USSR maritime fleet does not have monsters like the "Batillus" (around 600,000 tons), since for us tankers of the "Krym" type (150,000 tons) are preferable.

But it has turned out that while a ship with a capacity of 120,000 tons can be built part by part at an ordinary building slip — first one half, and then, after launching it in the water, the other, joining them up while they are afloat, this method is not appropriate for the "Krym" with a length of 296 meters and width of 45 meters. However, there is a way out of this situation also.

It turns out that a super-ship can be made out of standard modular blocks. Each of them is an isolated section within which there is a cargo tank which is separated from the side of the ship by cofferdams -- empty chambers. It is not difficult to mount relatively small modules on any building slip, placing them in any way along or across the launching rails, and then launching them into the water in the ordinary way. And when a sufficient number of steel "cubicles" have accumulated at the finishing wall they are united, then the standard noses and bows are put onto them, and a new tanker is ready. In particular, only eight modules are enough for a large tanker of the "Mir" type.



The problems of the introduction of the modular block method at wharves was also studied by us in our student scientific circle at the Sevastopol' Instrument Making Institute. The processes connected with launching modular blocks into the water were studied at the experimental basin of the shipbuilding and ship repairs department and we became convinced that the advantages of this method of ship building are obvious. Suffice it to say that by using it it is possible to appreciably decrease the time which goes for the construction of a ship, for there is nothing to prevent making several of the steel "billets" at the same time. In addition, metal is economized — for the basic parts and units and the sections themselves are unified which, in its turn, creates superior conditions for the mechanization and automation of all of the complexes of operations at the plant.



And, finally, if a ship which has been assembled from modules develops a small hole or a local deformation of its shell in an accident, ordinarily lengthy repairs amount merely to the replacement of the damaged "block" with a spare one. Incidentally, it is not difficult to perform planned repairs in this way also, for in tankers that part of the hull in which the liquid cargo is located wears out two to three times more rapidly than the other parts.

In conclusion, let us return to the problem of protecting the ocean against pollution by petroleum. As the experience of operating large-cargo tankers has shown, the chief reason for pollution is not so much accidents as the discharge overboard of the remnants of petroleum products along with the water which is taken on as ballast. Usually a contemporary tanker requires ballast which is equal to 40 to 50 percent of its useful load and, moreover, the tanks for this purpose are placed all along its length. But with a "block" ship on-board sections and cofferdams can be used for this purpose!

Since in a collision the cargo tanks which are protected by them remain whole, the necessity for using clean water for washing is obviated. In addition, the ship will certainly be made stronger on the basis of the additional hardness of the longitudinal bulkheads, and the loading of petroleum and the pumping out of ballast can be performed simultaneously. This means that unprofitable stopovers in ports will be decreased!

As you see, the introduction of modules in the ancient art of ship building (and not only tanker ships!) opens up truly exciting prospects before ship builders and seamen.

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CSO: 1829

CARGO-HANDLING GEAR FOR A LARGE BARGE CARRIER

Leningrad SUDOSTROYENIYE in Russian No 1, Jan 80 pp 22-24

[Article by V. A. Sirchenko: "Cargo-Handling Gear for a Large-Tonnage Barge Carrier"]

[Text] The cargo-handling gear from the KONE firm, which has been installed on the barge carrier "Julius Fučik"* with a deadweight of 37,850 tons (Sketch One), built by the Finnish firm of Valmet upon receipt of an order from the Soviet Union, is an extremely complex structure; it provides for the loading and unloading of 26 barges with a carrying capacity each of 1,100 tons over the course of 13 hours. The following elements are included in its make-up: two conveyors, catwalk bridges and accessories for the mounting of the barges while en route. The loading of the barges on board is accomplished in the following manner: the hoisting platform is lowered to a point that is below the water level. Tugboats push the barges into the stern section of the ship, where they are placed in the necessary position on the keel blocks of the platform with the help of winches with hydraulic drive. Then the hoisting of the platform begins. There is a catwalk bridge which connects the railway tracks of the platform and the deck at the level of each cargo deck. A conveyor is rolled under the barge, lifting the barge on jacks over the keel blocks in order to transfer the barge to the cargo deck. After this the conveyor carrying the barge moves to the place where it is to be stowed. Here the barge is lowered onto the deck keel blocks. In like manner the rest of the barges are set in place and secured while en route.

The hoisting platform is raised to the level of the top deck after the termination of loading operations and is also placed on supports while en route, while the conveyors are moved into hangars on the second deck.

A description of the basic parts of the loading and unloading gear of the barge carrier "Julius Fučik" is presented below. The hoisting gear (Figure 2) consists of a hoisting platform and structures that ensure the precise and safe performance of cargo operations:

* V. D. Pomenko, "The Barge Carrier 'Julius Fučik'," SUDOSTROYENIYE, 1979, No 10.

Figure 1.

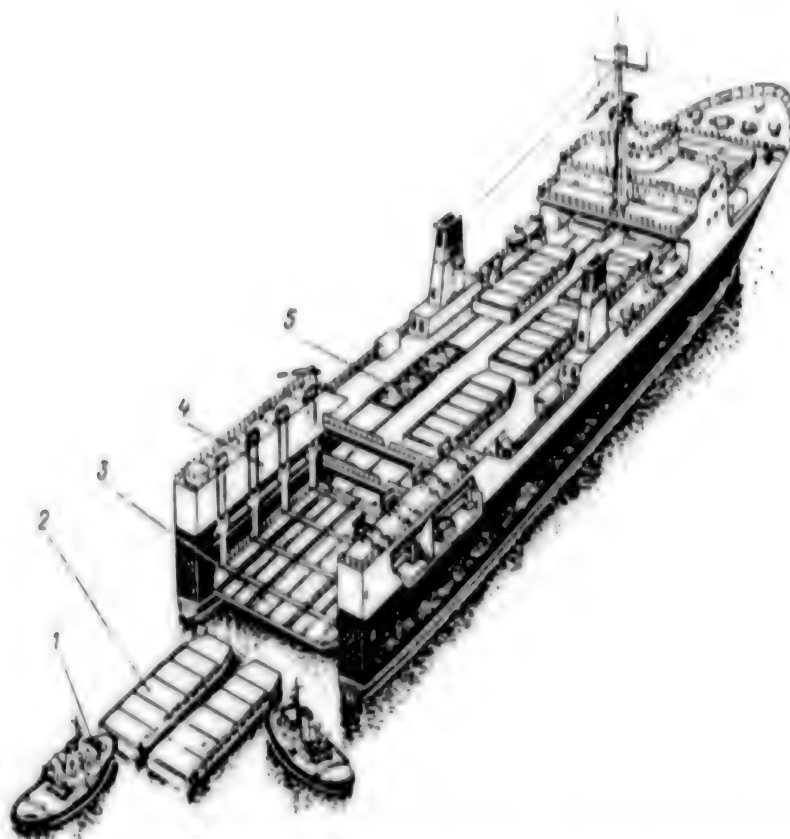


Рис. 1. Общий вид баржевоза «Юлиус Фучик» во время погрузки барж.
1 — буксир; 2 — баржа; 3 — подъемная платформа; 4 — борт кормового проема;
5 — транспортер.

Over-all view of the barge carrier "Julius Fučik" during the loading of barges.

Key: 1. Tugboat
2. Barge
3. Hoisting platform
4. Side of stern aperture
5. Conveyor

Basic Characteristics of the Hoisting Gear

Hoisting capacity, in tons	2,700
Speed of rise-descent, in meters/minutes	
with cargo (two barges)	0.7
without a load	14
Height of lift, in meters	21.5
Total power consumed, in kilowatts	710
Number of winches for hoisting, in units	8
Area of the hoisting platform, in square meters	1,000
Mass of the hoisting platform, in tons	540

Figure 2.

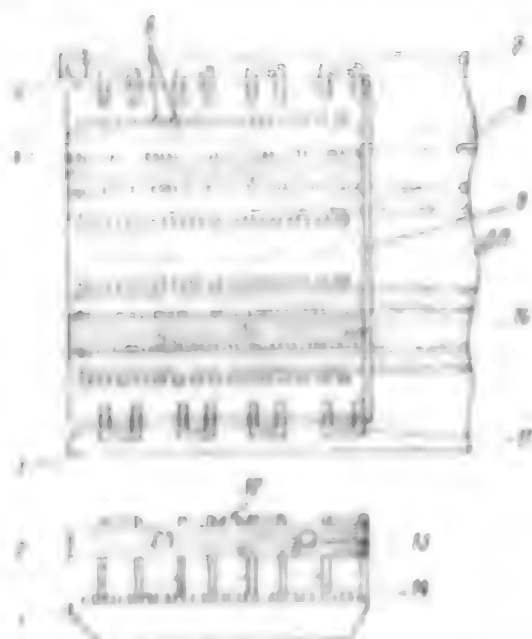


Рис. 2. Схема подъемного устройства.

1 - платформа; 2 - резиновые беговые дорожки; 3 - боковая щель; 4 - амортизаторы; 5 - поста управления; 6 - опорные блоки; 7, 8 - устройства для продольного и поперечного перемещения платформы; 9 - устройство для подъема платформы; 10 - настил; 11 - механизм для подъема платформы; 12 - регулирующий лебедок; 13 - люк; 14 - ограждение.

Diagram of the hoisting gear

- Key:
1. Hoisting platform
 2. Rubber runners
 3. Side of stern aperture
 4. Shock absorbers
 5. Control post
 6. Keel blocks
 - 7, 8. Devices for longitudinal and transverse adjustment of the platform, respectively
 9. Railway tracks
 10. Planking
 11. Mechanism for lifting the platform
 12. Adjusting winch
 13. Hawse hole
 14. Guardrail

The welded steel hoisting platform consists of four crossbeams and four longitudinal girders of an I-beam profile. The hoisting shafts are fastened to the ends of the crossbeams. Vertical displacement of the hoisting platform is accomplished along four corner steel runners along which the bronze lateral supports of the platform move. They set the location of the platform at each cargo deck: in the longitudinal direction it is set with the help of device No 7 and in the transverse direction it is set with the help of device No 8 (Figure 2). The keel blocks of the hoisting platform have been mounted on the platform's longitudinal girders between the railway tracks, which are earmarked for the horizontal movement of barges on conveyors. Resilience of the keel block is ensured thanks to the rubber fender that is included in its design. The horizontal rubber runners have been made fast for directing the movement of barges onto the hoisting platform and for deadening lateral blows to the hoisting shafts of the platform. The precise setting of the barge at the spot where it is to be fastened is accomplished with the help of cables wound up onto adjusting winches. The setting of the hoisting platform in terms of height is accomplished at each deck by a special device. Guard railings have been provided for on the platform to ensure safety during servicing and the making of repairs.

The safe load for the hoisting platform when two barges and conveyors are placed on it is $2 \times 1,500$ tons. Furthermore, a concentrated load from the

Figure 3.

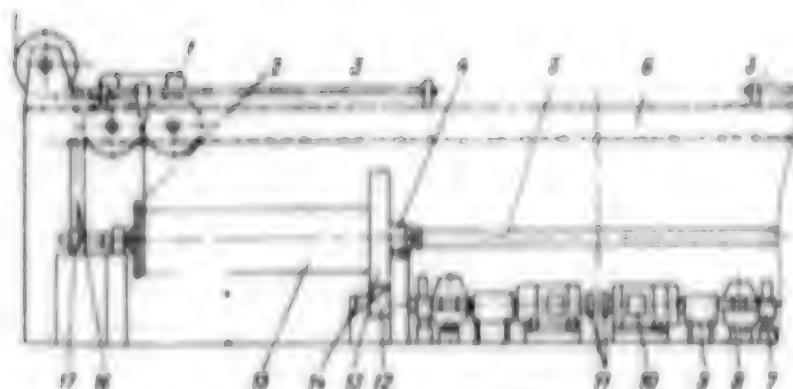


Рис. 3. Схема лебедки механизма подъема платформы.
1 — корпус самоподъемника; 2 — канат; 3 — вал; 4 — шкив; 5 — промежуточный вал; 6 — рама; 7 — тормоз; 8 — редуктор; 9 — шарнирный муфта; 10 — электрический мотор; 11 — муфта; 12 — шестерня; 13 — колесо; 14 — балансирующее устройство; 15 — барабан; 16 — цепная передача; 17 — звездочка.

Diagram of the winch for the mechanism for lifting the platform

Key:	1. Carriage for cable packer	10. Electric motor
	2. Cable	11. Coupling
	3. Screw	12. Pinion
	4. Support	13. Wheel
	5. Transmission shaft	14. Interlocking safety device
	6. Casing	15. Drum
	7. Brake	16. Chain drive
	8. Reduction gear	17. Sprocket
	9. Articulated coupling	

four-wheeled device in terms of 216 kilo-Newtons per wheel is permitted between the railway tracks. The remaining surface of the platform has been calculated for a spread load of up to 2,450 kilo-Pascals.

The shifting of the hoisting platform is accomplished by eight winches with block and tackle situated in the superstructures of the sides of the stern aperture of the barge carrier at the corners of the platform. The equipment for lifting the platform has a self-contained control system. They are stowed away in two cables in two layers on each drum of the winch with the help of the cable packer. The gearing of the cable wiring of the mechanism for lifting ensures uniform tension on the cables. The winch that is earmarked for hoisting the platform consists of the following basic units: a drum with a reduction gear and electric drive (Figure 3). A two-speed electric motor with a direct current with a voltage of 350 volts, with a power of 88.5 kilowatts, a frequency of rotation of 2,000/1,000 revolutions/minute and a relative switching-in duration = 30 percent has been employed for the latter. The electric motor is connected with the articulated coupling with a quadruple reduction gear. An electrohydraulic brake has been mounted on the transmission shaft of the reduction gear. The rotation of the pinion, which has been planted on the outer shaft of the

Figure 4.

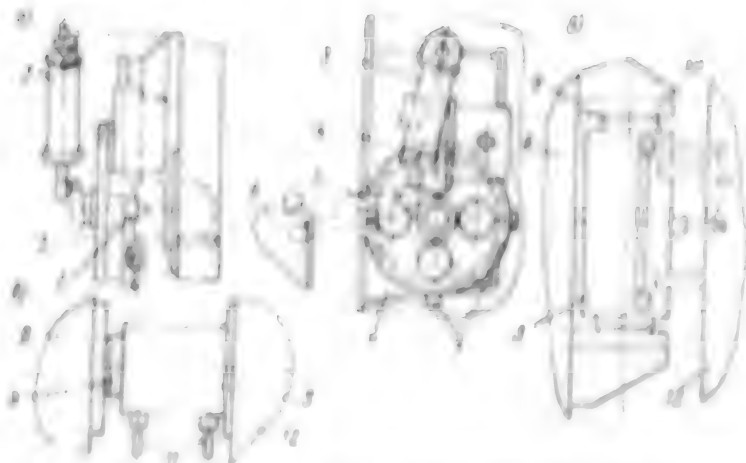


Fig. 4. Control devices for the hoisting platform: (a) no circuit (b), no height (c), no length (d).

1 - potentiometer, 2 - circuit breaker, 3 - gear drive, 4 - compression spring, 5 - lever, 6 - side of barge, 7 - side of stern aperture, 8 - hoisting platform, 9 - piston, 10 - prop, 11 - hydraulic system, 12 - deck of the barge carrier.

Diagram of devices for the setting in place of the hoisting platform: in terms of height (a), in terms of breadth (b), and in terms of length (c).

- Key:
1. Circuit breaker
 2. Gear drive
 3. Hydraulic cylinder
 4. Potentiometer
 5. Lever
 6. Side of barge
 7. Side of stern aperture
 8. Hoisting platform
 9. Piston
 10. Prop
 11. Hydraulic system
 12. Deck of the barge carrier

reduction gear, is conveyed to the gear wheel of the drum, and then through a chain drive to the carriage of the cable packer. In case the electric motor of any one of the winches goes out of operation, the possibility of operating it from the drive of the neighboring winch has been provided for. The rotors of the two electric drives are connected for this through junction box No 11 or through the two drums with the help of transmission shaft No 5. In the latter instance, repair of the electric motor that has broken down is possible.

The stopping of the hoisting platform with predetermined precision at a certain height is provided for by a special device (Figure 4a) which consists of a lever that rotates on antifriction ball bearings, of a compression spring, a gear drive, a potentiometer and circuit breakers. As soon as the platform stops at the predetermined position, the potentiometer sends a signal to the control post, where the corresponding signal lamps light up. The precision with which the platform stops relative to the piston engine is provided for on each deck by a device (Figure 4b) that consists of a hydraulic cylinder with two pistons. The movement of the pistons is equal to the gap between the supports of the platform and the casing of the hydraulic cylinder. The precise location of the platform is determined in terms of the equality of pressures on the pistons from the side of the supports. A device (Figure 4c) consisting of a hydraulic cylinder, a piston of which rests on the edge of the platform, is utilized for the adjustment of the platform in a longitudinal direction. The quantity of the pressure in the hydraulic system is likewise the criterion here for the position of the platform. The control of the platform is accomplished from the main control panel after precision adjustment of the platform in terms of height.

Figure 5.

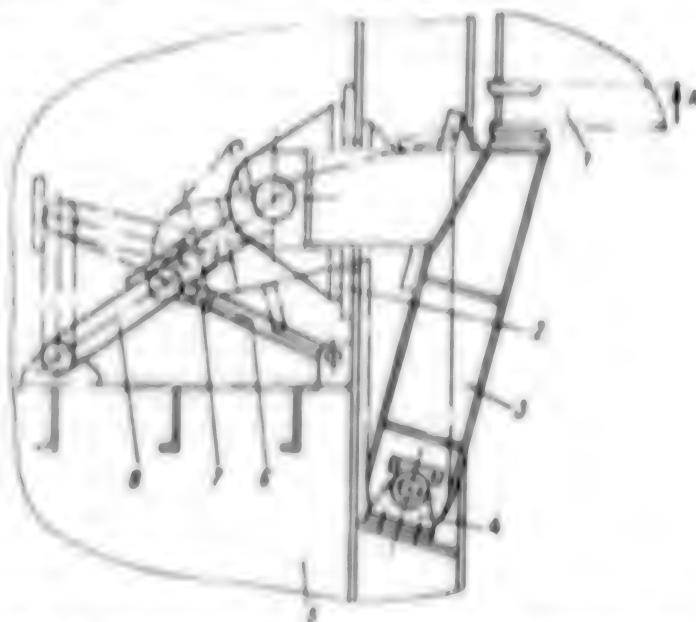


Diagram of the device for the placement of platform while en route

- Key: 1. Hoisting platform
2. Gasket
3. Holder
4. Support
5. Side of stern aperture
6. Hydraulic cylinder
7. Rod
8. Lever

Рис. 5. Схема устройства установки платформы по ходуному

1 - подвешивающая платформа, 2 - прокладка, 3 - держатель, 4 - опора, 5 - борт кормового проема, 6 - гидродвигатель, 7 - шток, 8 - рычаг.

Figure 6.

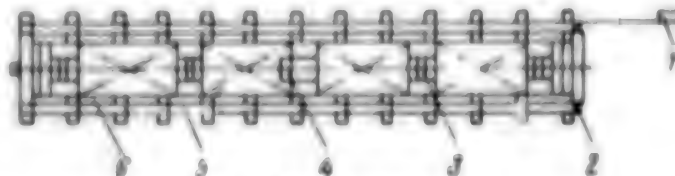


Рис. 6. Схема транспортера.

1 - самопереключающее устройство, 2 - устройство крепления транспортера по ходуному, 3 - гидродвигатель, 4 - масляный бак, 5 - тележка, 6 - ролик.

Diagram of conveyor

- Key: 1. Current-transmission device
2. Device for fastening conveyor while en route
3. Hydraulic unit
4. Oil tank
5. Truck
6. Casing

The hoisting platform is set in position while en route on special devices (Figure 5) arranged on the sides of the stern aperture at the corners of the platform. The device consists of a holder connected to a support and of a gasket. Displacement of the holder is accomplished with the help of a hydraulic cylinder, which brings influence to bear on the levers. In case of damage to the hydraulic system, a spring device will not allow spontaneous movement of the holder to occur. During the setting in place of the platform while en route, the platform is at first raised to level "A," where it brings influence to bear on the circuit breakers, which bring the holders out into an "on"

Figure 7.

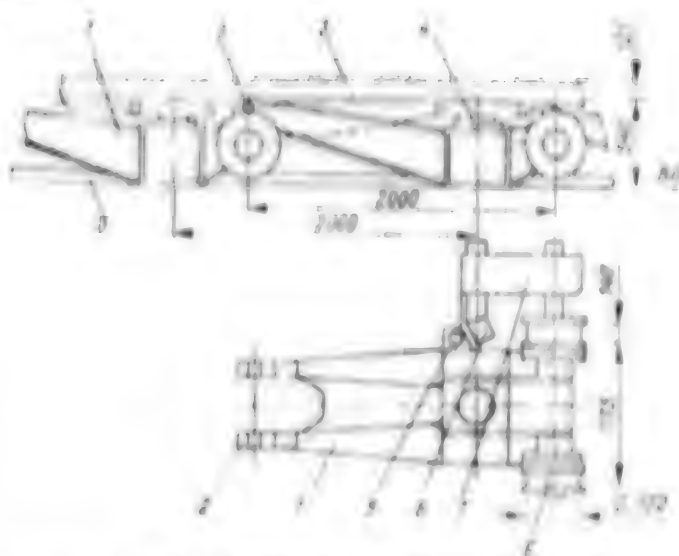


Diagram of the truck on the conveyor

- Key:
1. Casing
 2. Regular hinge
 3. Hoisting beam
 4. Hydraulic cylinder for lift
 5. Rails
 6. Wheel
 7. Reduction gear
 8. Hydraulic motor
 9. Elastic hinge

Рис. 7. Схема тележки транспортера.

1 - корпус, 2 - обычный шарнир, 3 - подвешивающая балка, 4 - гидравлический цилиндр, 5 - рельсы, 6 - колесо, 7 - редуктор, 8 - гидравлический мотор, 9 - эластичный шарнир.

position; after this the platform is lowered to the holders. The holders are removed for the transfer of the platform to another deck. The control of the device is accomplished from the hydraulic unit, which is situated on the side of the stern aperture.

The transport device consists of conveyors on the left and right sides which can be delivered to any of the three decks with the help of the hoisting platform.

The conveyor (Figure 6) consists of separate trucks, to which a steel casing is fastened on hinges. There are four hydraulic units with electric equipment, which obtains its supply of current through a mobile cable truck, which are placed on it. For the purpose of heightening the rigidity of the casing, the bracing of it with steel-wire rope with turnbuckles arranged along the diagonal has been provided for. The trucks of the conveyor are connected one with another and with the casing on hinges (Figure 7). Each truck has a mechanism for locomotion with hydraulic drive. A hydraulic motor rotates the axle of the running wheels through a double cylinder reduction gear.

The conveyor is equipped with hoisting beams with hydraulic cylinders. At the end of the rod on the hydraulic cylinder there is a spherical bearing which transfers effort to the hoisting beam through intermediate plates. An elastic rubber rim compensates for misalignments of the hoisting beam during its movement, which rules out interlocking of the hydraulic cylinders.

There are four catwalk bridges each to provide an opportunity for the conveyor to cross from any of the decks onto the hoisting platform on the

cargo decks. Each of them consists of a steel bearer frame with railway tracks and of hinges. The lifting and lowering of the bridge's frame is accomplished with the help of hydraulic hinges. The lowering of the frame is possible only after the final setting in place of the platform relative to the deck and to the stern aperture. The control of the lifting and lowering of the bridge is handled from a special control panel.

After delivery of the barges to the locations where they are to be stowed on the decks, they are lowered onto keel blocks and unfastened while en route. This is done with the help of screw braces on the top deck, while it is done on the remaining decks with a worm-screw attachment.

The loading and unloading gear on the barge carrier "Julius Fučik" is a rather complex set of equipment. Experience in operation will enable one to evaluate its efficiency, reliability and long-range prospects for vessels of the model in question.

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NEPTUNE DESIGN BUREAU DEVELOPS AIR-CUSHION AMPHIBIOUS CRAFT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 3 Apr 80 p 4

[Article by V. Istomin, staff correspondent: "To Fly on Land"]

[Text] They had been getting ready for starting up the engines all day, having forgotten about eating and resting. But the darkness was sneaking up on them all the more rapidly. When they turned on the searchlights and the shafts of light fell on the strange machine, it turned out that dozens of people were standing around—despite the late evening, no one had left from the facility of the Central Design Bureau.

The device was firmly tied to the ground with ropes so as not to fly up too high and so as not to make a run into the crowd which had gathered. "Start it up!"—echoed the command. But the engine began to sputter, breathing puffs of smoke out of the exhaust pipe. But right on the spot something began to rumble in the motor compartment and a crash and peal resounded. And metallic fragments poured out of the air intake....

In the morning they investigated the matter: the blades of one of the fans came loose and caught in the shield. After a week they put in a new fan. The start-up of the engines went successfully. It remained only to check the craft in action. But they did not allow the designers themselves on board--the first failure had ultimately undermined confidence in them.

They stood on the shore and watched with horror as their craft, which had been created for swift flight, crawled—no other word can be found—along the gulf slowly, in zigzags, with strain, roaring and lifting dark clouds of spray. The air cushion lifted the device above the water, but it did not want to move as it was supposed to. Why? Had they really made a mistake in the calculations?

"Your craft does not want to go," the testers passed the sentence. "It lacks steerability! It's as if you had created a cripple."

That was something to be despondent over and cause to lose heart. But they were absolutely sure of their own rightness. Aleksandr Kudryavtsev, Aleksandr



Rubinov and Valeriy Protsenko sat all evening until midnight over the calculations and estimates. But in the morning, taking advantage of a moment to spare, they sat down in the craft and started the engine. They went out into the gulf and gathered momentum—and the craft ran smoothly! It turned out that it was simply necessary to know how to steer the craft.

Now they can recall this history of the birth of their first-born with a smile: after all, there is in existence as of this time a "Bars" which has proven their maturity as designers and has enabled them to write off all their past "sins," shelving them in the files. But then they were just beginning....

"It's only that there are people far from our work who naively assume that everything is already clear concerning devices that operate on an air cushion," says Aleksandr Kudryavtsev, chief designer of the "Bars." "But, in fact, as recently as several years ago you could number all such craft in the entire world in the dozens. And, in our country we had only built several experimental machines as of that time. So we did not particularly have to rely on foreign know-how."

Together with Rubinov and Protsenko, he came to work at the "Neptune" Central Design Bureau right after the institute. All of them, these young specialists, wished to prove themselves in interesting and creative work and did not want to draw bolts. And each of them had his own "brilliant" ideas. Protsenko rushed about with a dream of using a magnetic-gas-dynamic engine on boats. Rubinov wanted to create a mini-submarine. Kudryavtsev then felt an immense respect for aviation and worshipped the might of rockets. But here at the Central Design Bureau they were occupied with pleasure boats and small-tonnage vessels. Here, it seemed, they wouldn't get around to their flights of fantasy.

They failed to evaluate correctly the attention paid to them when G. Andreyev, chief engineer of the Central Design Bureau, entrusted them, yesterday's

students, with drafting a plan for a crane for a ship. He had taken a definite risk, but did not regret this: the crane "worked out." But the main thing was that it had become clear that a creative micro-collective had appeared in the person of this threesome, one capable of working with originality and inventiveness. Andreyev, having literally guessed their secret dreams, suggested to these kids:

"Try to devote yourselves to an air cushion. It is very interesting work and has long-range prospects."

They could devote themselves to the "cushion" only in free time when not engaged in their basic work. But this did not trouble them, although much had to be begun practically from ground-zero. From the very start they had decided that it was not necessary just to create the next experimental "toy," but rather a realistic design for a multi-seat craft. So that it would be easy to manufacture and to operate, economical and reliable. So that it could go into series production and serve people—otherwise, all this work would have no meaning for them. And so when specialists from various scientific research organizations, knowing of the numerous failures of the more experienced designers, at first reacted with skepticism toward their proposals and calculations, they did not lose heart. They themselves understood that much of what they suggested was in contradiction to what was generally accepted.

I don't know what would have come of this entire undertaking if I. Martynov, chief of the Central Design Bureau, had not believed in it. This means he knew how to "unloose" funds for the construction of an experimental model, he included their research theme in the plan and provided them with the opportunity to work on the craft not just in the evenings. The designers and technologists from all parts of the Central Design Bureau and workers at the facility worked on this unusual machine with interest and enthusiasm. Thus their first-born appeared. Shortly thereafter an improved variant, the "Bars-1," was made. They likewise violated traditions here: for the first time in the history of the Central Design Bureau the craft was submitted not in summer, as it's customary to do, when it's put into the water, but in winter.

At the scheduled testing which was held not long ago, the "Bars" obediently rushed over the fields covered with deep snow. It was as if it was nothing for it to do this—deep snow, clearings in the ice on the river and steep hills. The surprised fishermen got up from their holes and followed the swift craft with their eyes as it flew over the earth with the speed of an express train. Even those who had guessed that it had an air cushion under it could not understand how it could be set in motion and gather speed. For, as you see, the "Bars" does not have the traditional pusher propellers, as, for instance, are found on aerosleighs.

"The craft is speeded up by a jet stream of air," Aleksandr Rubinov, who was setting at the helm, explained to me. "Those same fans are creating it which supercharge the air for the 'cushion.' But it is possible to control the direction of these streams with rudders, forcing the craft to turn."

Rubinov attempted to demonstrate all the potentials of the "Bars": we rushed over the ice of the Klyaz'minskoye Reservoir, we spun over the snowy plain and swung around on the spot. Finally, on full speed ahead, we burst into the coastal thickets of rushes.

"If we had had an airscrew, it would have broken into smithereens in the rushes or in the bushes," meanwhile says Protsenko. "But, as you see, this does not frighten us. Just as many other things don't...."

Rubinov speeds up the craft and steers it directly toward a steep and high shoreline embankment. The sensation is not one that one is generally accustomed to: it seems as though we are crashing into the hill or that the machine simply doesn't have enough strength. But the "Bars" flew up onto the precipice with ease.

"It can develop a speed of up to 80 km/hr over an even surface—over dry land, snow or ice," says the designer.

This amphibious craft was intended for physicians and signalmen, geologists and fishermen and for the trailblazers of Siberia, the North and the Far East. It will be indispensable everywhere where there is water, impenetrable swamps and marshes and the insidious plain of the tundra. Ten people can be accommodated in its spacious cabin. It can also haul cargoes with a weight of up to 800 kilograms.

"In principle it is already possible on the basis of the 'Bars' to make a draft design for a 20-seat craft," says Kudryavtsev. "But the draft for the 'Gepard,' which is a small four-seat craft, is still for the present on our drawing boards. "And yet...." the chief designer glanced at his colleagues, literally appealing for agreement, "And yet we will, apparently, make a device with a large carrying-capacity for work in the Far North."

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CSO: 1829

INTEGRATED QUALITY CONTROL SYSTEM FOR SHIPBUILDING

Leningrad SUDOSTROYENIYE in Russian No 12, Dec 79 pp 34-36

[Article by B. S. Polonskiy, V. P. Prokof'yev and V. A. Saliyev]

[Text] Intensive work on the creation of an integrated system of product quality control (KS UKP) for the shipbuilding industry began in 1975 after publication of the decree of the CC CPSU about the experience of the party organizations and leading personnel of the L'vov oblast on improving the quality of production. Serving as the basis for their investigation, were the systems for resolving special problems in improving product quality which, at that time, already were under way at enterprises such as zero-defect work, zero-defect product manufacture and also the systematic recommendations on integrated systems of product quality control developed by Gosstandart USSR [State Committee on Standards of the USSR Council of Ministers].

The system for product quality control in shipbuilding is being developed as a composite of interrelated, continuously acting, management, engineering, technical, and social measures within the framework of the existing administrative structure of the industry. The measures assure having a purposeful influence on the conditions and factors affecting product quality. A goal of the system is the assurance of product quality level conformity with established requirements with the minimum of expenditure on its creation and operation. This can be achieved by solving the following problems:

- establishment and assurance of the necessary level of product quality in the development stage.
- assurance in the production stage of the product quality level established in the design.
- maintenance of the product quality level achieved in the operational stage.

Product quality control is accomplished by the proper performance of the following subsystems (Figure 1): a subsystem for establishing requirements for, planning, and forecasting product quality, a subsystem for providing an assigned product quality level, a subsystem for monitoring and evaluat-

Table 1 - A Presentation of the Tasks in Integrated Systems of Product Quality Control

(1) Тип задачи	(2) Качество по про- дукции	(3) Качество по труду	(4) Качество средств труда	(5) Качество предметов труда	(6) Факты, влияющие на качество
(7) Планирование	11	12	13	14	15
(8) Контроль	21	22	23	24	25
(9) Анализ и оцен- ка	31	32	33	34	35
(10) Учет	41	42	43	44	45
(11) Регулирование	51	52	53	54	55

(12) Примечания: 1. Номера задач расшифровываются по наименованию соответствующих строк (первая цифра) и столбцов (вторая цифра). Например: 41 -- учет качества продукции; 12 -- планирование качества труда.

(13) 2. Под использованными терминами понимается: продукция -- техническая документация и изготовленная продукция; труд -- труд исполнителей и труд подразделений; средства труда -- технологические процессы, технологическое оборудование, испытательное оборудование, измерительное оборудование, оснастка и инструмент; предметы труда -- материалы, полуфабрикаты, комплектующие элементы.

(14) 3. Факторы, влияющие на качество: условия труда, квалификация исполнителей, метрологическое обеспечение, организационные вопросы и т. д.

1. Type of Task
2. Quality of product
3. Quality of labor
4. Quality of work-means
5. Quality of work-pieces
6. Factors affecting quality
7. Planning
8. Monitoring
9. Analysis and evaluation
10. Follow-up
11. Regulation
12. Note 1. The designations of the tasks are made up with the first digit corresponding to the number of a line, and the second digit corresponding to the number of a column. For example: 41 is the follow-up product quality, and 12 is planning labor quality.
13. Note 2. For the terms used, the following is to be understood: Product includes documentation and the manufactured product. Labor includes that of individuals and subdivisions. Work-means include technological processes, technological equipment, test equipment, measuring equipment, tools and instruments. Work-pieces include materials, semifinished articles, and sets of elements.
14. Factors affecting quality are: condition of work, qualifications of workers, metrological provisions, management issues, and so on.

ing the product quality level achieved, and a subsystem regulating product quality and for perfecting the methods of administering product quality.

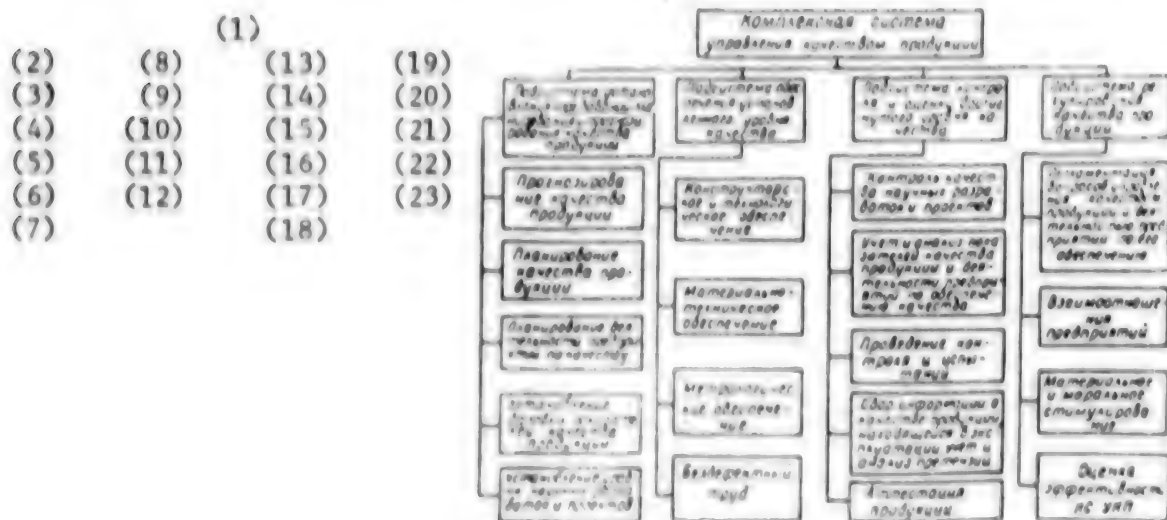


Figure 1. Structure of an Industrial System of Product Quality Control.

1. Integrated system of product quality control
2. Subsystem for establishing requirements for, planning, and forecasting product quality.
3. Forecasting product quality.
4. Planning product quality.
5. Planning the work of the enterprises on quality.
6. Establishing basic indicators of product quality.
7. Establishing the level of scientific development and design.
8. Subsystem for providing the established level of quality.
9. Design and technological assurance.
10. Material and technical assurance.
11. Metrological assurance.
12. Zero-defect work.
13. Subsystem for monitoring and evaluating the achieved level of quality.
14. Monitoring the level of scientific development and design.
15. Follow-up and analysis of the indicators of quality and the work of the enterprises on assuring quality.
16. Conducting monitoring and tests.
17. Assembly of information on the quality of the product while in use, follow-up and analysis of grievances.
18. Certification of product.
19. Subsystem for regulating quality.
20. Ruling on questions about quality control and the work of enterprises
21. Interrelations of the enterprises.
22. Material and ethical stimulation.
23. Evaluating the effectiveness of the integrated quality control system.

Table 2.
Basic Indicators of the Operations of an Industrial Enterprise
Characteristic of Improvement in Product Quality Because of an
Integrated System of Product Quality Control

Indicator	Unit of Measurement
Proportion of products accepted upon first presentation, to the total number produced.	%
Losses from defective products in relation to net cost of gross production.	%
Number of complaints received.	No.
Losses from complaints in relation to net cost of gross production.	%
Number of authorizations for deviation from specification.	No.
Proportion of workers with a personal certificate in the production staff.	%
Mean arithmetic coefficient of the quality of labor of the enterprise.	%
Proportion of products with:	
A superior category of quality	%
A first " " "	%
A second " " "	%
Uncertified (in production subject to certification)	%
Mastery of new kinds of products (number of items).	No.
Second quality products removed from production.	No.
New technological processes introduced.	No.
Indicator of rythmicality (according to the number of presentation for each ten days of the month).	%

Table 3.
Basic Indicators of the Work of a Design Enterprise
Characteristic of an Improvement in Quality of Product and Labor
Because of an Integrated Quality Control System

Indicator	Unit of Measurement
Proportion of documents accepted on first presentation in the total volume of documentation, adjusted to 11 [?] format.	%
Mean arithmetic coefficient of the quality of labor according to the SBT [System of Zero-Defect Labor] of the enterprise.	-
Number of acknowledged complaints or grievances.	No.
Ratio of losses from complaints or grievances to the total volume of in-house work.	%
Ratio of the number of notifications of changes of documentation according to item 7 of GOST [State Standard] 2.503-74, to the total volume of documentation, adjusted to 11 [?] format.	%

Each of the listed subsystems embodies a series of tasks. The structure of the integrated system of quality control in industry leads to the implementation of such control functions as the establishment of the requirements for product quality, the receipt and analysis of information about product quality, the making of decisions about product quality control, the assignment of control duties, the receipt and analysis of information about changes in product quality which come about as result of implementing control.

The interaction of the enterprises and the management of the industry in the process of quality control is determined by the structural scheme for management of the integrated system of quality control. (Figure 2) In ac-

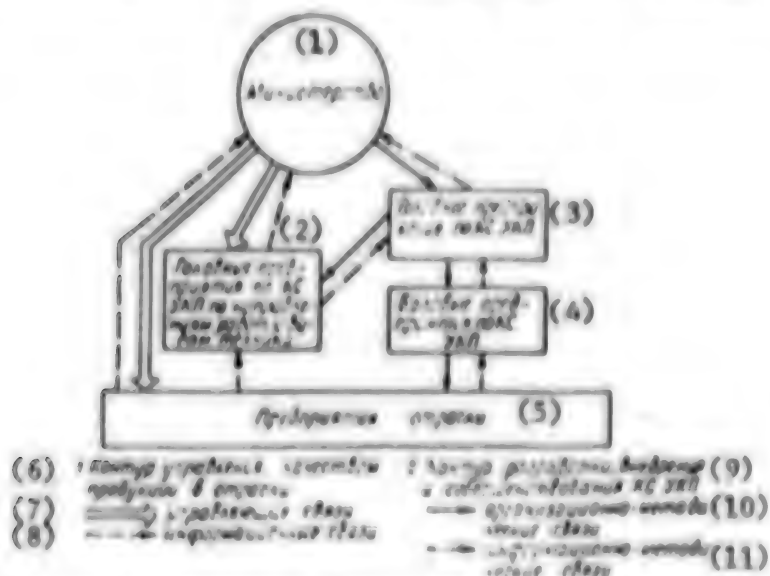


Figure 2. Management Structure of the Integrated System of Quality Control for the Industry

1. Ministry
2. Primary enterprises on the direction of operations and the kinds of technologies in the integrated system of quality control.
3. Primary enterprises for the integrated system of quality control.
4. Basic enterprises " " " " " " " "
5. Enterprises of the industry.
6. Loop for product quality control in the industry.
7. Control communications
8. Information communications
9. Loop for development, introduction, and perfection of the integrated system of quality control.
10. Management communications on methods.
11. Information on methods.

cordance with this scheme, in industrial quality control there are two control loops: the first assures the operation of the system in the period of

its introduction and use, the second functions in the development, introduction, and perfection of the system. The operation of the first loop is being accomplished in conformity with the scheme which was taking shape in the industry for the management of production. The second loop is intended to provide a unified methodological approach to the development and introduction of the system of quality control. This work on the system is being carried out at enterprises of the industry under the leadership of the main administrations, with leadership on methods by primary and basic enterprises. The assignment of duties to the enterprises of the industry in the development and introduction of the system is being established with documents drawn up by the industry.

In the integrated system of product quality control, a primary enterprise carries out the following principal functions: it provides a unified, orderly approach to the development and introduction of the system, it brings about orderly leadership in the direction of the operations and the kinds of technologies, and also, with the basic enterprises, it dictates the principal guidance for the development and perfection of the system.

The basic enterprises provide leadership on methodological problems with the development and introduction of the system at enterprises, they make up long-range coordinated plans and annual plans, and they analyze criteria for evaluating product quality and the effectiveness of the system.

In the directions of the operations and the kinds of technologies, the primary enterprises assure achievement of a high technical level in the products, they develop the basic indicators for the principal aspects of the products (criteria of quality), and they evaluate the technical level and quality of designs and products.

The most important stage in the creation of an industrial integrated system of quality control is the development and introduction of the system at the enterprises. This process is being accomplished in accordance with the industry's instructions as developed by the primary enterprises, and in accordance with the recommendations of Gosstandart. In this, fundamental attention is being addressed to the implementation of a systematic approach. For this purpose, the presentation shown in Table 1 was developed. It permits defining the make-up of the standards for the quality control system of an enterprise.

The system of quality control at an enterprise can function successfully only with the adjustment of the whole assemblage of the tasks of the quality control system to the standards of the enterprise. At the same time, to evaluate the degree of adoption of quality control at enterprises, the evaluation should not be based on the number of developed and applied standards, but on the more objective indicator - the number of resolved tasks. According to this approach, a measure of the adoption of quality control at enterprises is the following indicators [next page]

$$k = \frac{\sum_{i=1}^n n p_i}{25m}.$$

- m is the number of enterprises in the main administration.
 n is the number of tasks of the integrated system of product quality control resolved at the enterprises ($0 \leq n \leq 25$);
 p_i is the number of enterprises at which n tasks have been resolved
 25 is the number of tasks, the resolution of which, ensures the adoption of the integrated system of quality control at an enterprise.

The effectiveness of the quality control system of an enterprise is determined by typical indicators for evaluating the activities of an enterprise as presented in Tables 2 and 3. The criterion for evaluating the effectiveness of quality control, is the character of the changes in the listed indicators.

Experience in the development and introduction of an integrated system of product quality control in the industry shows that it is an effective means of improving product quality. The adoption of the integrated system must be completed in the current five-year plan.

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SYSTEM FOR PROVIDING MAINTAINABILITY OF SHIPS

Leningrad SUDOSTROYENIYE in Russian No 1, Jan 80 pp 50-53

[Article by D. T Chapkis and M.A. El'bert]

[Text] The effect of maintainability on the efficiency of the operation of ships is growing constantly. This is explained by the general tendencies in the development of technology connected with the substantial complexity of technical facilities and systems and the increased crucialness of the services they carry out. Applied to the maritime fleet, an increase in the maintainability of ships means a potential additional increase in the useful life of the fleet and a lowering of expenditures on maintenance and repairs.

We note that the annual losses of profits because of the removal of ships from operation for repairs are valued in millions of rubles that practically, are not regained, and the costs of the work on maintenance and repair for a modern ship for a normal period of service are commensurable with the cost of its construction.

In principle, there are four ways of increasing the useful life of ships: by increasing the quality of newly constructed ships, by improvement of maintenance and repair systems, by accelerating the preparation of ships for repair, and, finally, by accelerating the repair of ships at the plants.

Increasing the quality of ships under construction, especially by increasing reliability, occupies a special place in this group of interrelated ways. As investigations have shown, among the properties assuring the necessary level of reliability in ships, (dependability, maintainability, durability), maintainability has special importance. Increasing the level of maintainability is one of the most effective ways of cutting down on the repair time of ships. Besides, it should be taken into account that even with optimization of ships' operation and repair methods, it is impossible to increase a low level of reliability in an already-built ship.

According to level of maintainability, ships can be divided into three groups: high, medium and low. As calculations show, transfer of a large

portion of transport ships into a group with a higher level of maintainability would permit an 8 to 10-day reduction in the time ships are idled for repair annually, and thereby provide additional profits.

The key stage for assuring the maintainability of ships is during design. Studies made in recent years have made possible the development of a system to set up, evaluate, and provide the necessary level of maintainability for ships at all stages of the design.

In the development of the system on a unified methodical basis, the definitive concepts were formulated, the place and the interrelation of maintainability with other characteristics of ships was established, the principal conditions and requirements were worked out, the indicators and characteristics of maintainability and of the design and technological requirements for its provision were defined, and the necessary methods of calculation and the standardized basis were developed.

Structurally, the system for the maintainability of ships can be represented in the form of two groups of models - the reference model group and the controlling model group. The elements in the first group are: the principal characteristics of the ship, the fundamental concepts, the desired service, the aggregate costs, and the general requirements.

The place of maintainability among the other definitive characteristics of the ship is established in the subgroup of principal characteristics. In this, the sequence of subordination of the characteristics of quality, reliability, maintainability is basic.

In the subgroup of fundamental concepts, the terms and definitions in the field of maintainability are laid down. They have found reflection in industrial and state standards. Appearing in those documents as fundamental, defined, concepts are: maintainability, repair, maintenance, restorability, operating and repair cycles, and basic shipyard repair of a ship (instead of light and major repair) with retention of the traditional kinds of repair (current repair, medium repair, and capital repair). Citing only one of the fundamental concepts, the maintainability of ships is understood to be their suitability for the conduct of maintenance and repair.

The desired service is the basis for determining the necessary level of maintainability of the ship. It specifies the priority of the principal service of the ship in the determination of the indicators of its maintainability. It also specifies the calculation of auxiliary functions and the possibilities of limitations in the conditions of operation or in resources.

Aggregate costs are the economic extension of the preceding subgroups, permitting evaluation of the level of cost for the construction, repair and maintenance of a ship during its normal period of service. Other things being equal, the preferable variant is the one with the minimum aggregate

cost. Also, in this model there is feedback in the comparison of the assigned indicators of the maintainability of the ship with those obtained in the process of designing it. It permits establishing the value of each measure for increasing the level of maintainability of the ship.

Logical continuations of the listed models are: general requirements for the maintainability of a ship containing quantitative values of indicators of maintainability, requirements for design implementation of the ship from the point of view of suitability for maintenance and repair, and, finally, requirements for operating and repair documentation.

Responsibility for providing the maintainability of ships at all stages of their construction, operation, and repair must fall to the buyer who is obliged fundamentally to establish the necessary level of maintainability. To the designer must fall the responsibility for providing this level of maintainability by means of a composite of design and technological measures.

The controlling group of models is divided into two subgroups - one for the ship as a whole and one for its parts and systems. In the first subgroup are the characteristics of the level of maintainability, the determining factors, the choice of calculating methods, and the feedback. In the second subgroup are the characteristics of the level of maintainability of the parts of the ship and the corresponding factors being taken into account, and the feedback. The documentary provision and the software are common for both subgroups.

Both subgroups are closed systems the input of which is the level of maintainability including quantitative indicators and qualitative characteristics, the design and technological requirements, and supplementary requirements for operating and repair documentation. In the output is a comparison of the results obtained in the design with the assigned and standardized data. We dwell in detail on the controlling models.

The maintainability of a ship is evaluated quantitatively by the necessary expenditures of labor, time and money on the completion of planned maintenance and repair or restoration after a breakdown. The labor-consuming characteristic of maintenance and repair is used as the basic indicator of maintainability.

Indicators of maintainability are included in the specified characteristics of a ship and are subject to mandatory evaluation and assurance at all stages of the development of the design documentation, and in the process of construction, operation, and repair. Quantitative values of the indicators are determined for the whole standardized period of service of the ship.

As a basic principle of the assignment and evaluation of indicators of maintainability, differentiating the methods of calculation in relation to the stage of design should be considered so that the following are taken into account: the complexity of ships as technical objects, the extreme variety of ships' equipment and conditions of operation, the peculiarities of the systems for maintenance and repair, and other factors. The ambiguous character of the influence of the indicated factors on one another, and the difficulty of formalizing them, leads to requiring for each stage of the design, its own special method of calculating the indicators of maintainability.

At the stage of contract assignment, it seems advisable to use a general system approach in combination with the standardized base of the buyer and generalized experience in the operation of ships. At the stages of contract proposal and preliminary design, it is advisable to use approximate methods and regression analysis. At the stage of contract design, it is advisable to use element-by-element calculation.

In working out the maintainability section of the contract assignment, experience has shown the use of the proposed approach to be soundest. With it, the assigned level of maintainability turns out to be fully practicable for accomplishment in the process of design and construction.

In the stages of contract proposal and preliminary design, generalized calculations of the indicators are carried out according to statistical models, with the aid of which the analytical relations between the indicators of maintainability and the fundamental technical and operational characteristics of the ship (as available at the given design stage) are established. Most widely used in the establishment of the analytical relations by the statistical models, is regression analysis.

It is suggested that the method of element-by-element calculation of the expenditure of labor and money on the maintenance and repair of a ship be used in the more thorough calculations of the indicators of maintainability in the contract design stage.

Essentially, the method consists in the differential analysis and evaluation of the level of maintainability of the individual elements of the ship with subsequent conversion into indicators of the maintainability of the ship as a whole. In conformity with this, the pattern of operation and repair cycles, the periodicity, the forms, the labor-consuming characteristic, and the cost of maintenance and repair for all principal elements of the ship (elements of the 1st and 2nd category of importance) are determined. Subsequently, the operating and repair cycles of the elements and of the whole ship are coordinated and the labor-consuming characteristics and the cost of maintenance and repairs of the ship are summed up. The importance of these data are established taking into account peculiarities of the use of the ship and its equipment differentially for the different stages of a standardized period of service (mean operating time for a year, operating time to breakdown, service lives, periods of service of elements up to estab-

lished kinds of repair, the labor-consuming characteristic of each kind of repair, and so on.)

Verification of the conformity of the indicators of maintainability of a design with the requirements in the contract assignment is carried out by comparing the values of the indicators obtained as result of the calculations with the indicators assigned by the buyer. In the comparison, the fulfillment of the general requirements for reliability as established by the buyer on the basis of the purpose of the ship, the conditions of operation, and the requirements for technical and operational characteristics, is taken into account. In case of nonconformity of the calculated indicators with the requirements of the contract assignment, the necessary design and technological changes are made to the design and the calculations checked. The calculation is done by the method of successive approximations. In this, account is taken of the fundamental design and technological requirements for providing maintainability of the ship and its parts developed up to the present. These are: the requirement for unification and standardization, for continuity of technological processes and equipment, for suitability for inspection, for accessibility, for ease of removal, for interchangeability, for efficiency of arrangement, for mechanization and automation in carrying out operations, and also the procedure for disposition and stowage of spare parts and requirements for servicing departments.

In determining the merit of measures for providing maintainability, one should determine the aggregate costs for the construction, maintenance, and repair of ships. These costs must reflect all expenditures for live and past (reified) labor, expressed in cost form. In addition, it is advisable to use, for the comparison of the effectiveness of the indicated operations, the real indicators, and, first of all, the labor-consuming characteristic. Thereby the number of factors being taken into account can be substantially reduced, and the scope of the processes being directly considered can be limited.

The feedback on the criteria of cost (in rubles) can be expressed in the following form:

$$\min \sum_i^I 3_i = C_{\text{cr}} + \sum_i^I P + \sum_i^I TO + \sum_i^I Y + \Delta KB, \quad (1)$$

where: $\sum_i^I 3_i$ - is the aggregate cost in the i-th variant of the calculation.

C_{cr} - is the cost of construction of the ship.

$\sum_i^I P, \sum_i^I TO$ - are the corresponding expenditures on maintenance and repair for the standardized period of service of the ship, T_H (taken equal to the amortization period).

$\sum_i^I Y$ - is the loss from withdrawal of the ship from service for maintenance and repair (with comparison of variants of the calculations).

K - is the capital investment in the construction, expansion, or reconstruction of shipbuilding plants, ship repair enterprises and bases for maintenance connected with the implementation of the ship design.

A characteristic feature of such an approach is that it takes account of the losses from withdrawing a ship from service in an explicit form. Practice has shown that for large tonnage ships, this factor has decisive importance.

The feedback on the criterion of labor-consuming characteristics can be represented in the following relative form:

$$h_{min} = \frac{H_{cnp} + \sum_{i=1}^n h_{vi} + \sum_{i=1}^n h_{ri}}{T_n Q}, \quad (2)$$

where: h_{min} - is the specific indicator for the labor-consuming characteristic (specifically for transport ships).

H_{cnp} - is the labor-consuming characteristic of building the ship.

$\sum_{i=1}^n h_{vi}$, $\sum_{i=1}^n h_{ri}$ - are the corresponding costs of the labor-consuming characteristic in maintenance and repair of the ship for its standardized period of service.

Q - is the deadweight (cargo capacity) of the ship.

For solving the problems of evaluating and forecasting indicators of the maintainability of a ship and its parts, various computer equipment can be used. In the general case, the interrelation of the indicators of maintainability and the factors determining it can be identified with a multicomponent dynamic system with much feedback and with nonlinear characteristics of the individual elements.

There are two approaches of a similar kind to the solution of the problems. The first consists of a thorough investigation of the mechanism of the process as result of which a rather complete theory is developed. The other approach consists in the study and analysis of the processes according to their output characteristics. The solution of the problems within the framework of both approaches can be obtained with the use of the methods of expert, factor, or regression analysis, the methods of dynamic and linear programming, the theory of flow charts, and so on.

The system developed for the assignment, evaluation, and provision of indicators of the maintainability of a ship and its elements is reflected in the system of documentary provisions presented in the diagram. It contains the general requirements and the make-up of the indicators, the requirements for the design implementation of the ship and its component parts

according to suitability for maintenance and repair, methodological materials determining the procedure of calculation and the corresponding standardized base which permit carrying out the full quantitative provisions of the calculations.

It should be noted that the evaluation of the indicators of maintainability in the process of the operation of ships should be carried out after a period of familiarization and according to the results of completed operation and repair cycles, the number of which depends on their duration.

These are all the reasons to consider that, having a standardized basis, and also an accumulation of experience in the design and operation of ships of different purposes, one can, at the present time, assign, provide or verify indicators and characteristics of the maintainability of seagoing ships.

The principal works in the field of the theory and practice of the maintainability of ships directed toward its improvement are the following: the finishing of the differential methods of assignment and the calculation of indicators of the maintainability of ships at all stages of design, the quantitative description of design and technological specifications for assuring the maintainability of ships, the creation of a standardized base of calculations founded on well established needs for maintenance and repair, the putting in order of reference information, the improvement of the schemes for feedback calculations, and the introduction of a module for maintainability into automated ship designing.

Further development of the theory of maintainability and the methods of designing maintainable ships must restrictively be connected with the practical activities of the designers and operators. At present it can be asserted that conditions have been created which allow substantial increases in the maintainability of newly constructed ships.

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THE ALL-UNION SYMPOSIUM 'SAIL-79'

Leningrad SUDOSTROYENIYE in Russian No 1, Jan 80 p 21

[News item]

[Text] On the 13th through the 15th of September 1979 in Nikolayev at the Palace of Shipbuilders, the first All-Union scientific symposium on the study, design, and construction of modern sailing ships took place. It was organized by the Nikolayev, Order of the Labor Red Banner, Shipbuilding Institute imeni Admiral S. O. Makarov and the Black Sea interblast board of directors of the NTO [Scientific and Technical Society] imeni A. N. Krylov. The chairman of the organizing committee, Yu. S. Kryuchkov, opened the symposium at which specialists from 10 cities in the country gave about forty reports and communications.

Besides the plenary session, the work of the symposium took place in two specialized sections - a section on the mechanics of sailing ships (concerned with hydro- and aeromechanics, the dynamics and mechanics of the motion of ships, and also questions of speed and power), and a section on the design, construction, and model and full-scale testing of sailing ships. Together with questions about the construction of sailing ships for popular use and for tourists, the problem of sailing transport ships was considered. This is clear: the fuel crisis and the pollution of the environment make engineers and shipbuilders turn anew to the wind as a source of energy and to sails as the ecologically clean propulsion for ships.

The results of a preliminary study for the conversion of a 50,000 ton bulk carrier into a sailing transport ship was presented by V. N. Shchedrin and V. P. Shostak. The proposed sailing rig moves the ship with an operational speed of 13 knots in a force-5 wind. The height of the seven masts is about 70 meters. With an absence of wind, the sails are taken in automatically and the ship operates on a 4,490 kilowatt auxiliary diesel plant. As technical and economic calculations show, for such a sailing ship on certain transport lines, the operational expenditures turn out to be lower than for a diesel powered ship.

A design study of a sailing tourist trisaran with an auxiliary engine for service in rivers and seas stirred the interest of symposium participants. It was done in the laboratory for the study of ships with ecologically clean propulsion of the NXI [Nikolayev Shipbuilding Institute] of which Yu. S. Kryuchkov is the instructor. With a length of 30 meters, a beam of 14 meters and a sail area of 120 square meters, the ship can carry out cruises on the Dnioper and South Bug rivers and the Black Sea. The small draft (about 1 meter) allows the ship to pass along unmarked shores. The crew is 5 to 7 men.

The temporary rules for the construction of ferro-cement yachts developed by D. L. Biryukovich and D. I. Skvirskiy of Kiev have important practical significance. Reports about investigations of the application of wind engines on ships were made by: Yu. S. Kryuchkov, E. A. Stanchuk, B. V. Grigor'yev, and G. P. Lysenko (MAI) [Moscow Aviation Institute].

At the closing plenary session, a project for a coordinated plan for the use of sailing ships in the national economy was adopted, and then awards were presented to the winners of the contest of the Black Sea interblast board of directors of the NTO for the best work about sailing ships. In the adopted resolution of the symposium, the growing interest of specialists is noted in studies in the field of sailing ships for the national economy including transport ships, which, for the present, are being conducted on public initiative. In this connection, it is advisable to create an inter-industry coordinating council on the problem of sail to make provisions for it in the plan of scientific research work in the 11th Five-year plan.

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OCEAN AND RIVER

BRIEFS

VANINO-KHOLMSK RAILWAY FERRY--Concentration of earthmoving equipment has begun at a site in Vanino port for the beginning of construction of the second stage of the Vanino-Kholmak ferry crossing. Workers of construction and installation train No 284 who worked on the first stage of the crossing, will also build the new project. They will build access tracks and several abutments for the installation of devices which will move the railway cars on to the decks of the ferries. The second stage of the ferry service over the Tatar Strait should be completed and commissioned by May 1983. [Khabarovsk Domestic Service in Russian 0930 GMT 15 May 80 OW]

NAKHODKA SHIP REPAIR PLANT--It has been reported from Nakhodka that the capacity of the ship repair plant has increased after commissioning of a concrete embankment. The new mooring, which can simultaneously accommodate three vessels, has been commissioned 2 months ahead of schedule. [Vladivostok Domestic Service in Russian 0930 GMT 12 May 80]

CSO: 1829

MISCELLANEOUS

KASHIRSKAYA-BRATEYVO SEGMENT OF MOSCOW METRO

Moscow TRANSPORTNOYE STROITEL'STVO in Russian No 12, 1979 pp 11-13

[Article by engineer A. N. Krivoshein and candidate of technical sciences I. M. Yakobson (Mosmetrostroy)]

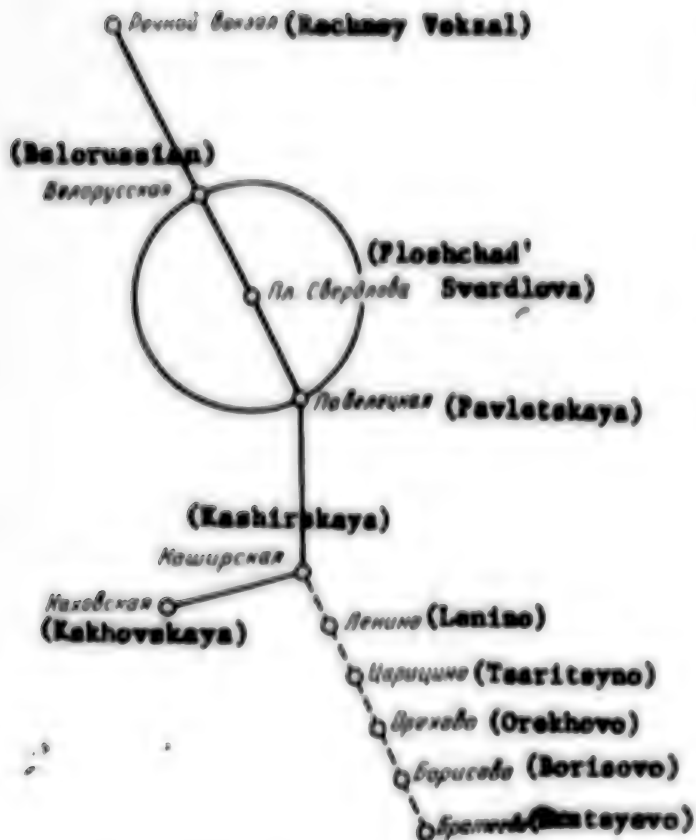
[Text] In 1979 the Moscow Metropolitan Subway Construction Association [Mosmetrostroy] began construction of a new 9.81-kilometer segment of the Zamoskvoretskiy radial line of the capital's metro, from Kashirskaya station to Brateyevo station. With the opening of this segment high-speed transportation will be made available to residents of the large residential areas of Lenino, Tsaritsyno and Orekhovo-Borisovo (See drawing).

According to preliminary data, the large residential complexes, through which this line is being built, house more than 300,000 people. And according to demographic projections, the population in the area of this line of the metro will reach 500,000 by 1990.

In the overall plan of development of the Moscow metro this new segment will be an integral part of the Gor'kovsko-Zamoskvoretskiy diametric line, connecting the southern regions of Lenino and Orekhovo-Borisovo with the northern regions of Aeroport, Sokol and Khimki-Khovrino through the center of the city.

The existing segment of the metro between Kashirskaya and Kakhovskaya stations will be operated temporarily as a Y-branch line after the Zamoskvoretskiy radial line is extended. In the future it will be part of the large ring route of the Moscow metro.

Layout of the route for the new segment was determined by the plan to locate stations at points with highest passenger density, taking into account existing urban construction, planned development of regions of the city and conditions which would allow construction of the line through a shallow passage. Additionally, the new line passes in the vicinity of a preserved architectural site--the Tsaritsyno estate. For this reason part of the metro tunnels have been designed to skirt the principal structures of the protected zone.



Gor'kovsko-Zamoskvoretzkiy
Diametric Line of the Moscow
Metro

Key:

- existing segments of the line
- Kashirskaya-Brateyevo segment (under construction)

From the sidings beyond Kashirskaya station the tunnel route will pass between high-tension transmission lines, involving minimal reconstruction of supports and urban buildings in the Lenino region. Then the tunnels will run along Proletarskiy Prospekt to its intersection with the Kursk route of the Moscow railway line, where an interchange will be erected at the existing platform of the Tsaritsyno suburban railway line. The tunnels will then pass under the Nizhne-Tsaritsynskiy pool in the vicinity of the old Kashira highway and along Orekhovskiy Boulevard to Brateyevo.

Plans call for construction of five stations on the new segment: Lenino, Tsaritsyno, Orekhovo, Borisovo and Brateyevo. The Lenino and Tsaritsyno stations will be situated on Proletarskiy Prospekt where the metro line intersects it, i.e. at Kantemurovskaya street and the Tsaritsyno railway platform respectively. The Orekhovo station will be located at the intersection of the old Kashira highway and Bazhenova street. The Borisovo and Brateyevo stations are situated along Orekhovskiy Boulevard at its intersections with the Kashira highway and Musy Dzhaliya street respectively. Beyond Orekhovo station and at the end of the route beyond Brateyevo station facilities are planned for turn-around of trains and night parking of rolling stock.

Four stations on the radial line have two underground vestibules each, connected by walkways under the street. At Orekhovo station exists are provided in two ground-level vestibules. The subway station platforms will be connected with the cash-turnstile halls of the vestibules by stairways and escalators, depending on the depth of the station foundation and elevation of the vestibule.

All stations are of the island type, with platforms 156 meters long and 10 meters wide. The Tsaritsyno, Orekhovo and Borisovo stations are to be standard for prefabricated ferro-concrete construction: two rows of columns with a longitudinal separation of 6 meters. The Lenino and Brateyevo stations are designed with single arches of monolithic ferro-concrete. The underground vestibules, ancillary structures and turn-around sidings are of standard plan designs and constructed from manufactured ferro-concrete modular elements.

The tunnel runs dug by the open-cut method will be built of standard re-inforced ferro-concrete modular elements and whole sections of re-inforced ferro-concrete. Linings of the tunnel runs cut by the underground-bore method will be of manufactured, unitized ferro-concrete blocks with rings 5.5 meters in diameter, ferro-concrete rings of the same diameter which are forced into the earth and, under unfavorable engineering and geological conditions, cast iron tube sections.

Architectural trim in the stations, vestibules and walkways will be of materials which satisfy requirements for use of the metro. Columns and walls of the stations and vestibules will be faced with various kinds of marble; floors of the station platforms and vestibules will be covered with slabs of polished granite; walls of the walkways and stairways will be faced with glazed, freeze-resistant tiles, parapets of the stairways will be faced with slabs of polished granite; the steps will be made from slabs of cooled granite.

Lighting in the stations, vestibules and walkways is luminescent.

Engineering, geological and town-building conditions were complicated by the following.

Beginning from a point just beyond Kashirskaya station, the tunnels are cut through territory free from buildings to the Lenino station. Farther on they pass under Proletarskiy Prospekt to Tsaritsyno station. For a total distance of four kilometers on these two segments the tunnels pass through partially flooded sand, sandy loam and clay-loam.

On the flooded segments of the run and at the Tsaritsyno station, with its ancillary structures and transfer junction, the builders will artificially lower the water level through the use of sub-surface pumps and probe-filter devices.

On the run between Tsaritsyno and Orekhovo stations the tunnels cut through water-saturated sand, sandy loam and clay-loam. Therefore, on the segment which passes under the banks and bed of the Nishne-Tsaritsynskiy pond provisions have been made to artificially freeze the earth.

Orekhovo station with its turn-around sidings, the tunnels between Borisovo and Brateyevo stations and the siding tunnels beyond Brateyevo station will be built in dry earth, consisting of clay-loam and sandy loam.

Given these conditions, Lenino and Tsaritsyno stations and their ancillary structures will be erected in pits with piling supports. Orekhovo station and its ancillary structures and turn-around track installation as well as the Borisovo and Brateyevo stations with ancillary structures and sidings at the end of the route will be erected in inclined pits.

The earthen walls of the pits with pilings are being worked with draglines with a bucket holding 0.5-0.6 cubic meters until the first course of buntons is laid. After this a bulldozer will be used for grading and moving earth to the dragline bucket. In the inclined pits draglines with an increased bucket capacity of 1 cubic meter are being used.

To assemble structural elements and place all types of materials in place on the stations and ancillary structures, the builders will use KKTs-20 gantry cranes with a lift capacity of 20 tons and a span of 25-40 meters. Standard technology will be employed to erect the columnar stations from prefabricated ferro-concrete. On the single-arched Lenino and Brateyevo stations, where structures of the platform segments are to be of monolithic ferro-concrete, work will first be accomplished on a broad front to erect the launder and the waterproof station walls. Then the arch will be poured in separate runs 6 meters long, using metal forms installed on a movable transport carriage.

The transfer junction at Tsaritsyno station will be erected at the suburban railway platform of the same name in a pit with pilings and piling-braced walls. Work on the transfer junction is planned to be done in two stages, involving partial relaying of the railway tracks. Construction of the junction is designed to use standard ferro-concrete elements.

Tunnels and ancillary structures on the run from Kashirskay to Lenino station, in the vicinity of the high-tension transmission lines, will be built by the open-cut method in inclined pits. Earth in the pits will be worked with draglines and within confines of the LEP [electric transmission line] zone bulldozers will be used and the earth will be pushed out of the LEP zone. The modular elements of the ferro-concrete tunnel linings will be assembled with K-255 boom cranes, with a lift capacity of 25 tons, from the bottom of the pit. On the segment where use of linings made of whole sections is envisioned on Eh-2508 boom crane, with a lift capacity of 60 tons, will be used. Segments of the tunnel route which are saturated with water will be dried out through boreholes by EhTsV-6 submersible pumps and LIU-66 water-lowering equipment.

Farther along the run between Lenino and Tsaritsyno stations the tunnels will be cut by the closed-bore method, using Shch-19 shields equipped with horizontal cutting surfaces. A significant part of the tunnels on the run will pass through water-saturated earth with the ground-water level coming close to the tunnel tubes (approaching Tsaritsyno station).

EhTsV-6 pumps will be used to lower the water level here.

The most difficult conditions for construction occur on the run between Tsaritsyno and Orekhovo stations. It is these conditions that will determine the length of time required to construct the first segment of the line and the line as a whole. The earth on this segment is of a diverse character, having a high ground-water level and a low water-loss rate. Therefore, the following methods are envisioned for construction of the tunnels. From Tsaritsyno station to the pond the tunnels will be built by the closed-bore method, using Shch-19 shields in a lining of cast iron tubes, with the tubing elements of the lining being installed by tube layers. On the route through the banks of the pond to the portion of segment 263 which lies under the bed of the pond, the earth will be frozen from the surface to a depth equal to a section through the tunnel. This will prevent surface settling while the tunnels are being cut. Also to prevent settling of the surface, it is planned that a quick-setting cement-sand mixture will be forced into the earth around the linings as the earth thaws. Where the tunnels intersect railway tracks the earth will be frozen through inclined bore holes.

The 356-meter segment of the tunnels under the bed of the Nizne-Tsaritsyno pond will be built with shields in a lining of cast iron tubing. Due to the presence of unstable, slow-draining sands in the tunnel area, preliminary freezing of the earth will be required here. To do this the builders will pour a sand causeway where the tunnels intersect the pond. This will form a working surface for drilling the freeze holes, rigging them, freezing the earth and laying temporary access roads.

The last segment of the run to Orekhovo station will also be built by the closed-bore method, using Shch-19 shields. The first 375 meters will be frozen to a depth equal to a section through the tunnel in stages, with water being pumped out by submersible pumps. Beyond the freeze zone the tunnels will be equipped with the same shields in the dry earth. Tunnel linings will be cast iron tubing in the freeze zone and they will be unitized ferro-concrete blocks farther along the run toward Orekhovo station. After the tunnels are cut through the pond region the earth will be thawed and the freezing column on the pond-bed segment of the route will be taken out. During the winter season when the pond is dry the sand causeway will be removed, the bed of the pond graded back to its original contours and the surrounding area restored.

Where the tunnels pass near the Bol'shoy bridge on the grounds of the Tsaritsyno estate it is envisioned that a "wall in the ground" barrier will be erected around the bridge as a protective measure.

Tunnels on the Orekhovo-Borisovo and Borisovo-Brateyevo runs will be built in dry earth. Therefore, it is envisioned that they will be cut by the closed-bore method by KM-24 machine complexes using ShchMR shields and ferro-concrete linings forced into the earth.

The new segment of the metro will be equipped with the newest operational equipment. For example, to provide regulation, automatic control, safety and traffic organization of the trains there will be: systems for automatic control of train speed (ARS), automatic control of trains (AUP), centralization of signals (EhTs), centralization of dispatchers (DTs) and automatic blocking systems with electromechanical automatic brakes and protective devices.

Maintenance of normal ambient air conditions in the stations and tunnels is ensured by a push-pull tunnel ventilation system. Ventilation units are to be VOMD-24 axial, two-stage, reversible fans with remote control.

After opening of the new sector the rolling stock of the Gor'kovsko-Zamoskvoretskiy diametric line will be serviced by the Sokol and Zamoskvoretskiy depots. The latter will be expanded by three parking bays and a one-way connecting siding will be built at the Kashirskaya station. With extension of the Zamoskvoretskiy radial line erection of a building to serve this line is planned.

To increase effectiveness of the use of capital investments, the new segment is to go into operation in two stages. Since turn-around facilities are to be built beyond the Orekhovo station, the initial segment to be opened will be the 6.32-kilometer stretch between the Kashirskaya and Orekhovo stations.

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MISCELLANEOUS

PROGRESS IN CONTAINERIZED FREIGHT SHIPMENT

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 1, 1980 pp 24-31

[Excerpt from article by A. Kobyakov, section chief, Gosplan USSR: "Machine Building--the Foundation of Technical Progress"]

[Excerpt] The development of containerized shipment is raising the level of mechanization in transportation. In 1979 the volume of containerized freight transported by rail increased by 11 million tons over 1978; by sea--by 800,000 tons; by river--by 750,000 tons. According to calculations, transporting one million tons of freight in containers frees 1,500 men from loading and unloading work, reduces freight transport operational costs by more than 10 million rubles and saves approximately 4,000 tons of metal and 200,000 cubic meters of lumber due to reduced requirements for storage space, packaging and rolling stock.

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